Water Resources Survey

Part I:

HISTORY OF LAND AND WATER USE ON IRRIGATED AREAS

and

Part II:

MAPS SHOWING IRRIGATED AREAS IN COLORS DESIGNATING THE SOURCES OF SUPPLY

Cascade County, Montana

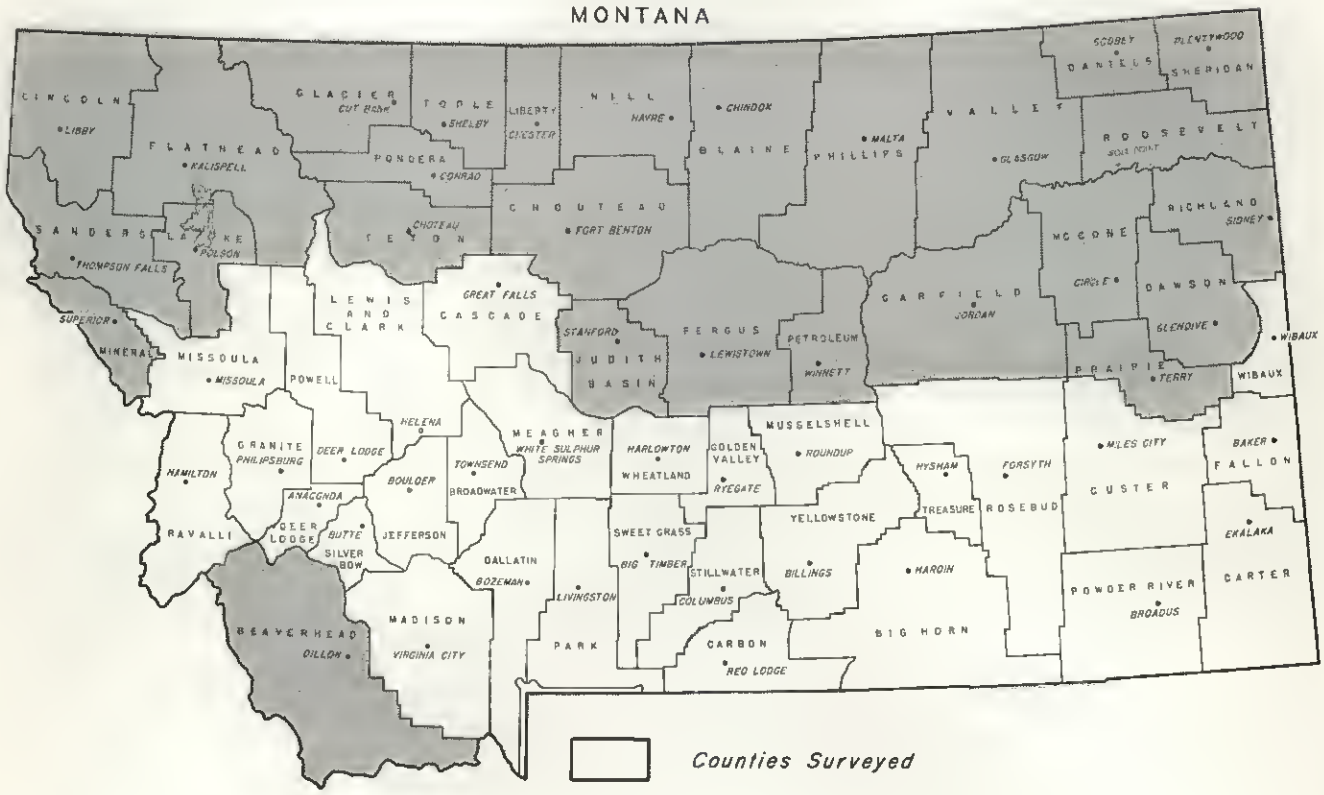
Published by
STATE ENGINEER'S OFFICE
Helena, Montana, June, 1961

WATER RESOURCES SURVEY

CASCADE COUNTY
MONTANA

Part I

History of Land and Water Use on Irrigated Areas



Published by
STATE ENGINEER'S OFFICE
Helena, Montana
June, 1961

STATE ENGINEER'S OFFICE

Fred E. Buck	State Engineer
Hans L. Bille	Assistant State Engineer
C. Sumner Heidel	Deputy State Engineer
A. D. McDermott	Accountant for State Engineer

STATE WATER CONSERVATION BOARD

Governor Donald G. Nutter	Chairman
C. H. Raymond	Vice Chairman and Secretary
Fred E. Buck	Member and Consultant
H. J. Sawtell	Member
A. G. Westwood	Member
George F. Sahinen	Chief Engineer
A. D. McDermott	Assistant Secretary

MONTANA STATE AGRICULTURAL EXPERIMENT STATION

O. W. Monson, Irrigation Engineer and Consultant, Bozeman

June, 1961

Honorable Donald G. Nutter
Governor of Montana
Capitol Building
Helena, Montana

Dear Governor Nutter:

Submitted herewith is a consolidated report on the Water Resources Survey of Cascade County, Montana.

This work was accomplished with funds made available to the State Engineer by the 36 Legislative Session, 1959, and in cooperation with the State Water Conservation Board and the Montana State Agricultural Experiment Station.

The report is divided into two parts. Part I consists of history of land and water use, irrigated lands, water rights, etc., and Part II contains the township maps in the County showing in colors the lands irrigated from each source or canal system.

Work has been completed and reports are now available for the following counties: Big Horn, Broadwater, Carbon, Carter, **Cascade,** Custer, Deer Lodge, Fallon, Gallatin, Golden Valley, Granite, Jefferson, Lewis and Clark, Madison, Meagher, Missoula, Musselshell, Park, Powder River, Powell, Ravalli, Rosebud, Silver Bow, Stillwater, Sweet Grass, Treasure, Wibaux, Wheatland and Yellowstone.

The office files contain minute descriptions and details of each individual water right and land use, which are too voluminous to be included herein. These office files are available for inspection to those who are interested.

The historical data on water rights contained in this report can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Respectfully submitted,

FRED E. BUCK, State Engineer

ACKNOWLEDGMENTS

A survey and study of water resources involves many phases of both field and office work in order to gather the necessary data to make the information complete and comprehensive. Appreciation of the splendid co-operation of various agencies and individuals who gave their time and assistance in aiding us in gathering the data for the preparation of this report is hereby acknowledged.

County Officials

Charles B. Snyder, Commissioner — Edward L. Shubat, Commissioner

W. D. Weir, Commissioner — J. L. (Joe) Lennon, Clerk and Recorder

Mrs. Agnes Schrapps, Clerk of the District Court

Percy H. Ross, Surveyor — Wm. D. Ryan, Assessor

Robert G. Dunbar — Professor of History, Montana State College

M. G. Burlingame — Department Head of History, Montana State College

Theodore Fosse — County Extension Agent

R. A. Dightman — State Climatologist, U. S. Dept. of Commerce, Weather Bureau

David R. Cawlfield — State Soil Scientist, U. S. Dept. of Agriculture, S.C.S.

Frank Stermitz — District Engineer, U. S. Geological Survey

Frank A. Crowley — Acting Head, Minerals Branch, Bureau of Mines and Geology, Montana School of Mines

Merle C. Brunsvold — Work Unit Conservationist, U. S. Dept. of Agriculture, S.C.S.

Walter J. Everin — Director, State Fish and Game Department

Charles L. Tebbe — Regional Forester, U. S. Dept. of Agriculture, Forest Service

George Ebner — Supt. of Sun River Project, F. Shaw and Greenfields Divisions

Kathryn Hoffman — Secretary, The Rocky Reef Ditch Company

Fred Sanborn — Secretary-Treasurer, Sun River Valley Ditch Company

The State Engineer's Office, Water Resources Survey, hereby expresses sincere appreciation to the many ranchers, farmers and stockmen who have given their helpful co-operation in this survey.

TABLE OF CONTENTS

FOREWORD

MONTANA'S WATER RIGHT PROBLEMS

Our concern over surface water rights in Montana is nearly a century old. When the first Territorial Legislature, meeting in Bannack, adopted the common law of England on January 11, 1865, the Territory's legal profession assumed that it had adopted the Doctrine of Riparian Rights. This doctrine had evolved in England and in eastern United States where the annual rainfall is generally more than twenty inches. It gave the owners of land bordering a stream the right to have that stream flow past their land undiminished in quantity and unaltered in quality and to use it for household and livestock purposes. Since the law restricted the use of the water to riparian owners and forbade them to reduce appreciably the stream flow, the early miners and ranchers in Montana favored the Doctrine of Prior Appropriation which permitted diversion and diminution of the streams. Consequently, the next day the legislature enacted a law which permitted diversion by both riparian and non-riparian owners. Whether or not this action provided Montana with one or two definitions of water rights was not settled until 1921 when the Montana Supreme Court in the Mettler vs. Ames Realty Co. case declared the Doctrine of Prior Appropriation to be the valid Montana water right law. "Our conclusion," it said, "is that the common law doctrine of riparian rights has never prevailed in Montana since the enactment of the Bannack Statutes in 1865 and that it is unsuited to the conditions here . . . "

The appropriation right which originated in California was used by the forty-niners to divert water from the streams to placer mine gold. They applied to the water the same rules that they applied to their mining claims—first in time, first in right and limitaton of the right by beneficial use. Those who came to the Montana gulches brought with them these rules, applying them to agriculture as well as to mining.

The main points of consideration under the Doctrine of Prior Appropriations are:

1. The use of water may be acquired by both riparian and non-riparian landowners.

2. It allows diversion of water regardless of the reduction of the water supply in the stream.

3. The value of the right is determined hy the priority of the appropriation; i. e., first in time is first in right.

4. The right is limited to the use of the water. Stream waters in Montana are the property of the State and the appropriator acquires only a right to their use. Moreover, this use must be beneficial.

5. A right to the use of water is considered property only in the sense that it can be bought or sold; its owner may not be deprived of it except by due process of law.

The State Legislature has provided methods for the acquisition, determination of priority and administration of the right. No right may be acquired on a stream without diversion of water and its application to a beneficial use. On unadjudicated streams, the Statutes stipulate that the diversion must be preceded by posting a notice at a point of intended diversion and by filing a copy of it within 20 days in the County Clerk's office of the county in which the appropriation is being made. Construction of the means of diversion must begin within 40 days of the posting and continue with reasonable diligence to completion. However, the Montana Supreme Court has ruled that an appropriator who fails to comply

with the Statutes may still acquire a right merely by digging a ditch and putting the water to beneficial use.

To obtain a water right on an adjudicated stream, one must petition the District Court having jurisdiction over that stream for permission to make an appropriation. If the other appropriators do not object, the court gives its consent and issues a supplementary decree granting the right subject to the rights of the prior appropriators.

Inasmuch as the Montana laws do not require water users to file official records of the completion of their appropriations, it becomes advisable as soon as the demand for the waters of a stream becomes greater than its supply, to determine the rights and priorities of each user by means of an adjudication or water right suit. This action may be initiated by one or more of the appropriators who may make all the other claimants parties to the suit. Thereupon the Judge of the District Court examines the claims of all the claimants and issues a decree establishing priority of the right of each water user and the amount of water he is entitled to use. The court decree becomes in effect the deed of the appropriator to his water right.

Whenever scarcity of water in an adjudicated stream requires an allocation of the supply according to the priority of rights, the Judge, upon petition of the owners of at least 15 per cent of the water rights affected, must appoint a water commissioner to distribute the water. After the Commissioner has been appointed the Judge gives him full instructions on how the water is to be apportioned and distributed in accordance with the terms of the decree.

The recordings of appropriations in local courthouses provides an incomplete record of the water rights on unadjudicated streams. In fact, the county records often bear little relation to the existing situation. Since the law places no restriction on the number or extent of the filings which may be made on an unadjudicated stream, the total amount of water claimed is frequently many times the available flow. There are numerous examples of streams becoming over appropriated. Once, six appropriators each claimed all of the water in Lyman Creek near Bozeman. Before the adjudication of claims to the waters of Prickly Pear Creek, 68 parties claimed thirty times its average flow of about 50 cfs. Today, the Big Hole River with an average flow of about 1,100 cfs has filings totaling 173,912 cfs. A person is unable to distinguish in the county courthouses the perfected rights from the unperfected ones since the law requires no official recordation of the completion of an appropriation. Recognition by the courts of unrecorded appropriations adds to the incompleteness of these records. To further complicate the situation, appropriators have used different names for the same stream in their filings. In Montana many of the streams flow through several counties; consequently, water right filings on these inter-county streams are found distributed in two or more county courthouses. Anyone desirous of determining appropriations on a certain river or creek finds it difficult and expensive to examine records in several places. In addition, the records are sometimes scattered because the original nine counties of 1865 have now increased to 56. As the original counties have been divided and sub-divided, the water right filings have frequently not been transcribed from the records of one county to the other. Thus, a record of an early approprition in what is at present Powell County may be found in the courthouse of the original Deer Lodge County.

It can be readily seen that this system of recording offers little protection to rights in the use of water until they are determined by an adjudication. In other words, an appro-

priator does not gain a clear title to his water right until after adjudication and then the title may not be clear because the Montana system of determining rights is also faulty. In the first place, adjudications are costly, sometimes very costly when they are prolonged for years. It is estimated that litigation over the Beaverhead River, which has lasted more than twenty years, has cost the residents of the valley nearly one-half million dollars. In the second place, unless the court seeks the advice of a competent irrigation engineer, the adjudication may be based upon inaccurate evidence. In the third place, if some claimant has been inadvertently left out of the action, the decree is not final and may be reopened for consideration by the aggrieved party. Another difficulty arises in determining the ownership of a water right when land under an adjudicated stream becomes sub-divided in later years and the water not apportioned to the land by deed or otherwise. There is no provision made by law requiring the recording of specific water right ownership on deeds and abstracts.

The Legislative Session of 1957 passed Chapter 114 providing for the policing of water released from storage to be transmitted through a natural stream bed to the place of use. The owner of the storage must petition the court for the right to have the water policed from the storage reservoir to his place of use. If there are no objections, the court may issue this right and appoint a water commission to distribute the water in accordance therewith. This law applies only to unadjudicated streams.

Administration of water on an adjudicated stream is done by the District Court, but it has its drawbacks. The appointment of a water commissioner is often delayed until the shortage of water is acute and the court frequently finds it difficult to obtain a competent man for a position so temporary. The present administration of adjudicated streams which cross the county boundaries of judicial districts creates problems. Many of the water decrees stipulate head gates and measuring devices for proper water distribution, but in many instances the stipulation is not enforced, causing disagreement among the water users.

Since a water right is considered property and may be bought and sold, the nature of water requires certain limitations in its use. One of the major faults affecting a stream after an adjudication is the failure of the District Court to have some definite control over the transfer of water rights from their designated places of use. The sale and leasing of water is becoming a common practice on many adjudicated streams and has created serious complications. By changing the water use to a different location, many of the remaining rights along the stream are disrupted, resulting in a complete breakdown of the purpose intended by the adjudication. To correct this situation, legal action must be initiated by the injured parties as it is their responsibility and not the Court's.

At one time or another all of the other Western Reclamation States have used similar methods of local regulation of water rights. Now all of them except Montana have more or less abandoned these practices and replaced them by a system of centralized state control such as the one adopted by the State of Wyoming. The key characteristics of the Wyoming system are the registration of both the initiation and completion of an appropriation in the State Engineer's Office, the determination of rights and administration by a State Board of Control headed by the State Engineer. These methods give the Wyoming water users titles to the use of water as definite and defensible as those which they have to their land.

When Montana began to negotiate the Yellowstone River Compact with Wyoming and North Dakota in 1939, the need for some definite information concerning our water and its

use became apparent. The Legislature in 1939 passed a bill (Ch. 185) authorizing the collection of data pertaining to our uses of water and it is under this authority that the Water Resources Survey is being carried on. The purpose of this survey is six fold: (1) to catalogue by counties, in the office of the State Engineer, all recorded, appropriated and decreed water rights including use rights as they are found; (2) to map the lands upon which the water is being used; (3) to provide the public with pertinent water right information on any stream, thereby assisting in any transaction where water is involved; (4) to help State and Federal agencies in pertinent matters; (5) to eliminate unnecessary court action in water right disputes; (6) and to have a complete inventory of our perfected water rights in case we need to defend these rights against the encroachments of lower states, or Wyoming or Canada.

Ground water and surface water are often intimately related. In fact, it is difficult in some cases to consider one without the other. In times of heavy precipitation and surface runoff, water seeps below the land surface to recharge underground reservoirs which, in turn, discharge ground water to streams and maintain their flow during dry seasons. The amount of water stored underground is believed to be greater at any given instant than the amount of surface water in Montana, and, without seepage from underground sources, it is probable that nearly all the streams in the State would cease to flow during the dry seasons.

It is believed that Montana's ground water resource is vast and only partly developed. Yet this resource is now undergoing a rapidly accelerating development as the need for its use increases and economical energy for pumping becomes available. Continued rapid development will undoubtedly cause waste and depletion of ground water in areas where it is not plentiful. Experience in other states has shown that once overuse of ground water in a specific area has started, it is nearly impossible to stop it, and may result in painful economic readjustments for the inhabitants of the area concerned.

To remedy this situation, the 37th Legislative Session, 1961, passed Chapter No. 237, which provides for a modern underground water code to be administered by the State Engineer's Office. This act does not become effective until January 1, 1962, but the Legislature failed to appropriate funds to carry out the provisions of the act between then and June 30, 1963. This act provides for a central State office where all filings, well logs, and other pertinent information pertaining to underground water rights will be available. It is hoped that some time in the future a similar code can be passed providing for a central State filing agency for surface water rights. This will eliminate the difficulties now encountered with surface water rights which are enumerated above. Accurate records concerning water rights and amount of water available are essential in the administration and investigation of water resources. The availability of these records in a central office under the control of a responsible State agency will provide a stronger and more accurate basis for the negotiation of inter-state water compacts, as well as set up means for the evaluation of data for in-State litigation. It will also protect all of Montana's use—both underground and surface water—from encroachments by lower states, or Wyoming, an upper state, or Canada.

METHOD OF SURVEY

Water Resources data contained in Part I and Part II of this report are obtained from courthouse records in conjunction with individual contacts with landowners. A survey of this type involves extensive detailed work in both the office and field to compile a comprehensive inventory of water rights as they apply to land and other uses.

The material of foremost importance used in conducting the survey is taken from the files of the county courthouse and the data required includes: Landownership, water right records (decrees and appropriations), articles of incorporation of ditch companies and any other legal papers in regard to the distribution and use of water. Deed records of landownership are reviewed and abstracts are checked for water right information when available.

Aerial photography is used by the survey to assure accuracy in mapping the land areas of water use and all the other detailed information which appears on the final colored township maps in Part II of the report. Section and township locations are determined by the photogrammetric system, based on government land office survey plats, plane-table surveys, county maps and by "on the spot" location during the field survey. Noted on the photographs are the locations of each irrigation system, with the irrigated and irrigable land areas defined. All the information compiled on the aerial photo is transferred and drawn onto a final base map by means of aerial projection. From the base map color separation maps are made and may include three to ten over-lay separation plates, depending on the number of irrigation systems within the township.

Field forms are prepared for each landowner, showing the name of the owner and operator, photo index number, a plat defining the ownership boundary, type of irrigation system, source of water supply and the total acreage irrigated and irrigable under each. All of the appropriated and decreed water rights that apply to each ownership are listed on the field forms with the description of intended place of use. During the field survey, all water rights listed on the field form are verified with the landowner. Whenever any doubt or complication exists in the use of a water right, deed records of the land are checked to determine the absolute right of use.

So far as known, this is the first survey of its kind ever attempted in the United States. The value of the work has become well substantiated in the counties completed to date by giving Montana its first accurate and verified information concerning its water rights and their use. New development of land for irrigation purposes by State and Federal agencies is not within the scope of this report. The facts presented are as found at the time of completion of each survey and provide the items and figures from which a detailed analysis of water and land use can be made.

The historical data contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up-to-date.

Complete data obtained from this survey cannot be included in this report as it would make the text too voluminous. However, if one should desire detailed information about any particular water right, lands irrigated, or the number and amount of water rights diverting from any particular stream, such information may be obtained by writing the State Engineer's Office in Helena.

HISTORY AND ORGANIZATION

The first record of the area within the present boundaries of Cascade County by white men was made by the Lewis and Clark Expedition in June, 1805.

In 1853, several members of an expedition headed by Isaac I. Stevens in surveying a route for a railroad to the Pacific, saw the great falls. Augustus Sohon, artist for the Stevens Expedition sketched a picture of the falls in the report published in 1855. The location of the fur post at Fort Benton caused the Great Falls vicinity to be by-passed by Stevens when he returned in 1855 to complete Indian treaties, and by Lieutenant John Mullan when he laid out the wagon road to Walla Walla, Washington.

In 1872 Milner Roberts and his son, Thomas P. Roberts, came into the area and named the two falls of the Missouri River, Rainbow and Black Eagle. They also gave the name of "The Long Pool" to the deep quiet water that extended ten or fifteen miles above the head of the rapids, where the present Great Northern Railway bridge spans the Missouri River, and in which a group of islands known as the White Bear Islands are situated.

The derivation of the names of Great Falls and Cascade County should not be hard to understand especially by those who have seen the wonderful cascades of the Missouri River in the vicinity of Great Falls.

Cascade County was organized on Sept. 19, 1887, from parts of Chouteau, Lewis & Clark and Meagher counties; parts of Meagher County were annexed between 1890 and 1900; parts of Cascade County were ceded to Judith Basin County in 1920 and 1941. There was an exchange area with Lewis & Clark County in 1941.

The Blackfeet Indians were in possession of the area of Cascade County when the Lewis and Clark Expedition passed through in 1805-06. Trapping and trading with the Indians followed the Expedition, but until the 1840's when they were decimated by smallpox, the Blackfeet maintained a hostile attitude towards trappers and traders. The establishment of a permanent post of the American Fur Trading Company at Fort Benton in 1847 eased the tension and trouble declined.

On June 30, 1867, Fort Shaw was established on the Sun River west of Great Falls to protect the travellers between Fort Benton and Helena. Freight from the east was shipped up the Missouri River to Fort Benton, head of navigation, and from there was freighted by wagons to Helena. Fort Shaw was an important stopping point enroute. In 1870 Colonel John Gibbon, commanding the 7th U.S. Infantry, took charge of the Fort. During the summer of 1891 the garrison was abandoned.

Stock raising was the first industry established, followed by dry land farming, mining, and irrigation, and more recently by industrial development.

In 1881 Paris Gibson, an engineer, visited the locality. The following May he began surveys of the town of Great Falls, and with the backing of James J. Hill, the Great Falls Water Power and Town Site Company was incorporated in 1887, the same year as the arrival of the Great Northern Railway. The town was incorporated in 1888 and Gibson was elected Mayor, which position he held for several years. Later, he was elected as Montana's representative to the U. S. Senate.

In an article in the Great Falls Leader, published in 1913, from which some of the attendant facts and figures have been secured, Senator Gibson said; "When I first saw the beautiful tract of land at the head of the upper, or Black Eagle Falls, I at once decided to found a city there. The advantages of establishing a great industrial and commercial center at that point appealed to me so forcibly that I decided at once to drop the business in which I was engaged and devote all my time and such energy as I possessed to laying the foundation for what I believed would, with the development of the Northwest, become a great city. Having succeeded in enlisting the powerful aid of James J. Hill in this work, a thriving town soon sprang up. It would be difficult to find another spot in all the Northwest Empire as advantageously situated as Great Falls for the centralization of commerce and industry, and, at the same time, for the creation of a beautiful residential city. Great Falls was laid out at the head of the falls with ample reservation for diversified activities, both large and small, that can in no way interfere with its residential districts, which are so situated as to command an impressive landscape view."

Both the Great Northern and Milwaukee railroads operate through Great Falls. There are branch lines extending in every direction into the mining and agricultural areas, thus making Great Falls "the hub," and one of the largest cities in Montana.

The development of hydro-electrical power from the falls was no doubt the most important factor in the rapid growth of the city. The comprehensive development of the Missouri River by the Montana Power Company resulted in the availability of 220,000 kilowatts of net plant capacity of power for the region and earned for Great Falls the title of the "Electric City." Five dams were constructed utilizing the 480 foot fall in a 16-mile reach of the river, with water passing through the Black Eagle Plant, which has 18,000 KW of capability: Rainbow, with 35,000 KW; Cochrane, with 60,000 KW; Ryan, with 60,000 KW; and Morony, with 47,000 KW.

The electric power from these hydro-electric developments not only supplies Great Falls and other areas of northern Montana, but is transmitted to the industrial centers of Butte, Anaconda, Helena, and Billings, and pulls the Milwaukee trains from Harlowton to Avery, Idaho, a distance of 400 miles. The total electric power output of the five plants is sufficient to supply seven cities the size of Great Falls.

The Black Eagle Plant, built in 1890, is Montana's first hydro-electric power development. This plant was rebuilt in 1927. Rainbow went into operation in 1910, and Ryan, which was completed in 1915, were developed to serve the State's nonferrous metal mining and smelting industry. Morony was completed in 1931, and Cochrane, the newest plant on the Montana Power system, was placed in operation in 1958.

The Lewis and Clark Expedition on the way up the river discovered the sulphur springs near Big Falls, and Giant Springs, one of the largest cold water springs in the United States. Commenting on the Giant Springs, the explorers said, "a large fountain boiling up from underneath the rocks near the edge of the river into which it flows, forming a cascade of eight feet." Giant Springs located on the south bank of the Missouri, about one mile upstream above Rainbow Dam and two miles below the city of Great Falls, has a river frontage of over 400 feet. The water temperature is about 52 degrees and is maintained the year-round. The U. S. Geological Survey has measured about 200 cubic feet per second flowing into the river from the springs, but a large flow enters the river from its bed and cannot be directly measured. It is believed that the entire springs inflow in the area is from 500 to

600 cubic feet per second which is probably exceeded by no other springs in the country. In the coldest weather its abundant flow raises the temperature of the river water sufficiently to eliminate all ice conditions for some distance below.

Cascade County has a land area which lies between a rich mining and stock raising district and the great agricultural basin of North Central Montana, where the open plains country meets the mountains. The County holds a prominent place in the variety and abundance of its own resources, such as, water, timber, coal, agriculture and stock raising. Mining has been extensively followed in the past. There are now many manufacturing plants of different types.

The rich agricultural area of Cascade County is located in the northern part, where the loamy soil, lying over clay subsoil makes possible good dry-land crop yields during normal years. In recent years the farmers have shown a marked co-operative spirit and worked together in practicing more modern methods of farm operations in endeavoring to raise the best possible crops. A large area of farm land is susceptible to irrigation by constructing a large canal diverting from the Missouri River, preliminary surveys for which have been made by the U. S. Bureau of Reclamation.

Flour milling in Great Falls began in 1885 when Paris Gibson built the first mill in this locality. In 1892 the Wasburn-Crosby interests built a large plant, which was incorporated into the General Mills holdings in 1929. The Montana Flour Mills Company, with its headquarters in Great Falls, has for many years been the largest manufacturer of flour in the State.

Some of the other major industries and businesses located in the Great Falls area are the Anaconda Copper and Aluminum Refining Plant and Wire & Rod Mills, Phillips Oil Refinery, meat processing, breweries, several machinery distributors, Great Northern and Milwaukee railroads, and district headquarters for many insurance companies, wholesale firms and Government agencies.

Great Falls was an early center of air flight activities. In 1942 Gore Field was chosen by the U. S. Air Force as a training center. In the same year a large air field then known as East Base, and now called Malmstrom Air Base, was built. In 1954 this field was made a Strategic Air Command and Air Defense Command Center.

The College of Great Falls opened in 1932 and in 1960 moved to a splendid new $3,000,000 campus on the southern edge of the city.

Charles M. Russell, noted western artist, made his home in Great Falls for many years. Located here are his log cabin studio and a new gallery containing many of his paintings.

Great Falls, the county seat of Cascade County, is the largest city in Montana, having a population (in 1960) of 55,357. The population of the County was 73,418, ranking it second among the counties in the State.

Other small towns and rural communities ranging from 50 to 750 people in the County are: Belt, Cascade, Simms, Fort Shaw, Sun River, Vaughn, Ulm, Sand Coulee, Stockett, Tracy, Armington, Monarch, and Neihart.

CLIMATE

With boundaries from the Southwest through Southeast reaching well into several lateral mountain ranges East of the Continental Divide, Cascade County topography varies from very mountainous generally in the southern third to rolling plains in northern portions. Principal streams drain generally to directions between north and east, but smaller streams can be found running in almost any direction in mountain and foothill sections. Climate characteristics of the County, particularly in the most populous areas, are affected to a considerable degree by the slope and direction of the principal streams; the Missouri River flowing generally northeastward, the Sun River eastward, Smith River and Belt Creek northward. Elevations range from about 2,730 ft. above sea level where the Missouri River flows into Chouteau County, about six miles south of Carter, to as high as 8,000 ft. or a little more on some of the higher peaks near the source of Belt Creek in the southeast corner of the County—an elevation range of over 5,000 ft.

Situated as the County is, well east of the ridge line of the Continental Divide, its climate has many Continental characteristics, but an extremely important exception is the result of the so-called "Chinook" (local popular term for what is called "Foehn" in many parts of the world) winds that are very common during colder months of the year. These winds are most common along the Missouri River itself from above Cascade to the Chouteau County line, although they occur nearly as often along the Sun River from the Lewis and Clark County line eastward and over the central and northeast quarter of the County. Valley locations are generally relatively warm for Montana, largely because of cold season "Chinook" winds, while some of the sheltered or higher valley areas run quite a bit cooler. The average annual temperature at both Cascade 5S and Great Falls is warmer than 45°, while Kings Hill (el. 7,300 ft.) averages only 34.4°, and Adel (about 22 miles south of Cascade, el. 5,200 ft.) averages 41.4°. Winter cold spells, almost always resulting from Arctic Air invasions, can produce very cold temperatures on occasion (see table), but these cold periods usually last only a few days at most, giving away gradually to the rather persistent "Chinook" effect in most of the County. Summers are pleasantly warm, with very few days that can be called really hot in any year. Great Falls, for example, experiences only 15 days a year, on the average, with maximums of 90° or warmer, and in many years the County's warmest has been cooler than 100°.

As usual in areas with large variations in elevation and more or less irregular topographic features, differences from place to place in precipitation are considerable. In general, the driest area is the northwest corner of the County, with some sections averaging as little, probably, as 11 or 12 inches a year. The wettest areas are along the mountains of the southeast corner, Kings Hill Pass averaging nearly 30 inches a year. It seems probable that some of the more favorably situated mountains of the south and southeast receive between 40 and 50 inches a year. The principal grain growing areas along the Sun and Missouri Rivers, however, average between 12 and 16 inches a year (see table). Snowfall is not particularly heavy, except along the southern mountains (Kings Hill Pass receives an average of 250 inches a year), with most valley sites averaging 50 to 60 inches a year.

Late spring and early summer are the wettest times of the year in the populous areas, while precipitation is fairly steady all year along the southern mountains. As is characteristic of much of Eastern Montana, from two thirds to three fourths of a year's valley precipitation falls normally during the April-September growing season. May and June experience frequent and sometimes heavy rains; June rainfall averages 4 inches or more in some of the

wetter areas. Late summer and fall weather is mostly sunny and pleasantly warm, but afternoon showers or thunderstorms are observed during July and August on an average of about one day in four. Thunderstorms, over the County as a whole, occur somewhere on about 50 days a year, about 90 per cent during the May - August period. These thunderstorms sometimes are accompanied by hail, but this phenomenon occurs mostly in the north half, and is large or severe enough to cause damage only over limited areas most years.

At Great Falls (the population center) the sun shines 64 per cent of the possible time throughout the year—ranging from 46 per cent in November to 80 per cent in July. Late fall, winter, and early spring average about 70 per cent cloud cover, while July averages only 40 per cent. Temperatures of 0°F. or colder occur on 23 days of an average year, 8 in January and 6 in February. Average early morning (5:00 a.m. MST) relative humidity varies from 63 per cent in July and August to 74 per cent in June, while afternoon (5:00 p.m.) relative humidity ranges from 62 per cent in January to 29 per cent in August. Freeze-free average periods for the County vary considerably, from 135 days (May 14 - September 26) around Great Falls, which should be close to the longest such period for the County, to 55 days at Adel, and probably less than 30 days in many valleys of the southeastern mountain areas.

Severe weather of only a few types is observed anywhere in the County with any notable frequency. Hail is probably as troublesome a weather element as occurs, but it seldom covers more than a small part of the County to a damaging degree. On the other hand, at least a little hail damage occurs somewhere almost every year. Tornadoes are rare—a funnel cloud is observed somewhere in the County about one year in seven, but only rarely does even slight damage result. Strong winds can be troublesome in an occasional year, but these cases are almost all the result of an unusually well-developed "Chinook" pattern, and are confined mostly to the Sun and Missouri Valleys themselves above Great Falls. The persistent strong wind effects of "Chinook" situations show up as an average wind speed at Great Falls for the year of 14.2 m.p.h., and a "fastest mile" of 82 m.p.h. was observed there in December 1956. Cold waves, as such, no longer present themselves as the formidable damaging or dangerous storms they were 30 to 50 years ago, due partly to better facilities for meeting their threats and to better warning services. The stronger cold waves, however, still can present series problems to the unwary or unprepared. Listed below is a tabulation of some of the weather data observed in Cascade County over the years:

CASCADE COUNTY WEATHER DATA

	TEMPERATURE				PRECIPITATION					
Station	Years of Record	Avg. Annual	Highest	Lowest	No. of Years of Record	Avg. Annual	Wettest	Year	Driest	Year
Great Falls Airport	25[1]	45.1	105	—35	25[1]	14.03	21.59	1951	7.45	1935
Sun River 5SW	7[2]	43.9	101	—46	14[3]	13.15	18.08	1951	7.67	1952
Cascade 5S	25[1]	46.0	109	—57	25[1]	14.47	19.94	1941	9.28	1935
Adel	22[4]	41.4	106	—50	22[4]	16.13	23.58	1932	8.42	1935
Kings Hill	11[5]	34.4	90	—41	15[6]	28.19	34.20	1950	21.65	1943
Ulm 8SE					13[7]	15.92	23.05	1953	9.63	1956
Power 6SE					7[8]	12.13	14.44	1955	8.16	1956
Millegan					16[9]	16.29	25.72	1941	9.24	1956

(1) 1931-1955, (2) 1953-1959, (3) 1942-1959, (4) 1931-1952, (5) 1942-1952, (6) 1938-1952, (7) 1947-1959, (8) 1953-1955, (9) 1940-1959.
There are a few shorter records, such as Cascade 20SSE (3 years), and two locations in Great Falls which are too short to add to the above picture. Representative of the drier area in the northwest corner of the county is the annual average precipitation at Fairfield, a few miles northwest of Sun River in Teton County, where the 1931-1955 annual average is 11.61 inches.
Note: Records for over 50 years are on hand for both Great Falls and Cascade 5S, but the shorter periods used herein improve comparability with other short term records in the county.

SOILS

The character of soils is determined by parent material, relief, vegetation, climate, and time. Since all of these soil forming factors vary widely in Cascade County, there is a wide variety of soils in the County. The geologic or parent materials in this County include: (1) loamy to clayey deposits laid down by glaciers, (2) materials weathering from sedimentary shales and sandstones (mainly Cretaceous in age but including pre-Cambrian rocks), and (3) Alluvium on broad high benches, alluvial valleys, local footslopes, fans and small closed basins. Because of variation in precipitation and in other climatic features, soils representing a large number of great soil groups are found. Those of common occurrence include Alluvial, Brown, Chestnut, Chernozems, Gray Wooded, Brown Podsolic, Regosols, Lithosols, and Humic Glei. The Agricultural soils are largely developed from glacial till, sandstones, shales, and alluvium. They include mostly soils of the Brown, Chestnut, Chernozem and Alluvial Great Soil groups, but there are inclusions of Solonetz and Lithosols.

Clay loam to loam textures predominate, but there are several important areas of clay or silty clay soils and sandy soils which are prominent in the area west of Great Falls. Solonetzic (claypan) soils are common on terraces along the Missouri and occur in lesser amounts throughout the County. Except for the Lithosols, most soils are of sufficient depth to provide adequate moisture storage for use by plants. Soils associated with shorter growing season and occurring at elevations generally about 5,000 feet include the Chernozems, Gray Wooded and Brown Podsolic soils and their associated Regosols and Lithosols. In general these soils are best suited for grazing, woodland, or wildlife use.

Principal problems associated with irrigated soils include: (1) shallow depth over gravel and associated low moisture storage capacity, (2) poor drainage and (3) a combination of poor drainage and high concentrations of toxic salts. High concentration of salt is frequently associated with soils of clay texture which are difficult to drain. The percentage of clay soils for which reclamation by drainage is not feasible is quite high in the area south of Cascade in the Missouri River Valley and near Fort Shaw in the Sun River Valley.

CROPS AND LIVESTOCK

Cascade County, one of the best agricultural counties in the State, is located in central Montana. It is enclosed by the Big Belt and Little Belt Mountains on the south and the Highwood Mountains on the east. The name comes from the rapids and falls, along the course of the Missouri River near Great Falls, the climax of this series of rapids and falls being the Great Falls of the Missouri, whence Great Falls was named.

Much of the topography is level to rolling plains with the eastern and southern parts being mountainous with deep canyons. There are four main streams flowing through the County, which are the Missouri River, Sun River, Belt Creek, and Smith River.

The County has a land area of 1,701,760 acres. The 1959 Government Census shows 1,033 farms and ranches totaling 1,522,434 acres, or 91.2% of the County area. The remainder of the land is largely mountainous. in private and National Forest holdings, and devoted to cities and towns. In this County, 833 of the farms are classified as commercial, the balance being mostly small acreages owned by operators employed in industry who use their farms for supplementing the family living.

There are 287 irrigated farms covering 45,982 acres of land. The total crop area in the County amounts to 495,944 acres. Major crops are as follows: 130,152 acres of wheat, 58,373 acres of barley, 7,542 acres of oats, 62,433 acres of hay, 29,054 acres of pasture and 194,019 acres devoted to summer fallow. The bulk of the farming land is located within 35 miles of Great Falls.

The eastern, southern, and western portions of the County are devoted to range land which in general, has a high carrying capacity for livestock. The 1959 Government Census shows 79,495 head of cattle, 48,683 head of sheep, 6,763 head of hogs, and 2,817 dairy cows. There are many fine purebred herds of Hereford and Angus cattle.

Dairying is devoted mainly to the irrigated area lying in the Sun River Valley, west of Great Falls. All of the dairies are producing quality grade "A" milk to supply Great Falls, Malmstrom Air Force Base and the surrounding towns. There is some fattening of cattle carried on a year-round basis in the irrigated areas.

SOURCES OF WATER SUPPLY

In Cascade County the principal streams which supply water for irrigation are; the Missouri River and its tributaries, the Sun River, Smith River, and Little Muddy Creek. Very little water is diverted for irrigation from the Missouri River. Practically all of the flow of the river is used for the development of electric power in the vicinity of Great Falls.

Belt Creek, having a large drainage area in the County, furnishes water for irrigation of only 340 acres. In past years more water was used for irrigation from this stream, but many of the headgates and ditches were washed out by flood conditions and never replaced. Generally, this stream carries water the year-round and could be utilized for more irrigation.

Missouri River

The Missouri River flows through Cascade County from southwest to northeast. During the year of 1960 there were 6,039 acres irrigated from the Missouri River and tributaries other than those named above. There are some areas of potential irrigable land along the Missouri River where the available water is not used to the fullest extent. An example of this is the land under the dissolved Chestnut Valley Irrigation District. In the survey we have mapped this land as irrigated, but a considerable acreage is not under irrigation at the present time.

Little Muddy Creek

Little Muddy Creek is located in the western part of Cascade County and flows into the Missouri River approximately five miles northeast of the town of Cascade. This drainage did contain some storage reservoirs for irrigation purposes, however the dams are now washed out and the projects abandoned. From this stream and its tributaries, there are 1,747 acres irrigated, with most of the water supplied from Little Muddy and its tributary, Rocky Gap Creek.

Smith River

The Smith River heads in Meagher County and flows northward through the center of Cascade County to its confluence with the Missouri about nine miles southwest of Great

Falls. Most of the land irrigated from the Smith River is in Meagher County, with only 345 acres irrigated in Cascade County. Hound Creek, a tributary of the Smith River, is the largest contributor of water for irrigation, serving a total of 2,214 acres.

Sun River

The Sun River is by far the most important source of water for irrigation in Cascade County. This stream is adjudicated and its water is used in Lewis and Clark, Teton, and Cascade Counties.

Two incorporated ditch companies that divert water from the Sun River for irrigation are; The Rocky Reef Ditch Company with 510 acres of irrigation and the Sun River Valley Ditch Company, irrigating a total of 3,199 acres.

The last and largest unit of irrigation in the County is the Sun River Project, built by the United States Bureau of Reclamation. This project's water supply is dependent on flood waters stored in reservoirs located on the upper tributaries of the river. Fort Shaw, one of two divisions of the Sun River Project, is located entirely within Cascade County and irrigates 10,055 acres. Greenfields, the other division of the project is in both Cascade and Teton Counties. Approximately one-fifth or 15,860 acres of land is irrigated under the Greenfields division in Cascade County.

STREAM GAGING STATIONS

The U. S. Geological Survey measures the flow of streams, co-operating with funds supplied by several State and Federal agencies. The results have been published yearly in book form as Water-Supply Papers, the latest being for the year 1959. The later records may be obtained prior to publication from the U. S. Geological Survey. That agency's records and reports have been used in the preparation of this resume'.

Data given below cover the stream gaging records which are available for Cascade County from the beginning of measurements through the water year 1959. The water year begins October 1 and ends September 30 of the following year.

The irrigated acreage figures shown for ditch diversions above the gage are taken from the final results of the counties completed by the Water Resources Survey for the active gaging stations operating at the present time (1961). For all other active gaging stations and those now discontinued, the acreage figures above the gage were estimated by the Geological Survey at the date of operation.

Following are equivalents useful in converting from one unit of measurement to another:

(a) In Montana, one cubic foot per second equals 40 miner's inches.

(b) One acre-foot is the amount of water required to cover an acre one foot deep.

(c) One cubic foot per second will nearly equal two acre-feet (1.983) in 24 hours.

(d) A flow of 100 miner's inches will equal five acre-feet in 24 hours.

(e) One miner's inch flowing continuously for 30 days will cover one acre 1½ feet deep.

For reference purposes, the stream gaging stations are listed in downstream order. The discharge quantities shown at the gaging stations are actual measured flows and have not been corrected for upstream storage or diversions for irrigation above the gage.

Missouri River at Cascade (Discontinued)

The chain gage was at the highway bridge at Cascade. The drainage area is 18,493 square miles. Records are available from July. 1902 to Sept. 30, 1915. The maximum discharge observed was 54,250 cfs (June 5, 1908) and the minimum observed, 800 cfs (Sept. 2, 1914). The average discharge for 13 years (1903-15) was 6,360 cfs or 4,604,000 acre-feet. The highest annual runoff was 5,740,000 acre-feet (1908) and the lowest 2,650,000 acre-feet (1905). There were diversions for irrigation of about 588,000 acres above the station. The flow was regulated by Hauser and Canyon Ferry power plants.

Missouri River near Ulm*

The water stage recorder is 6 miles east of Ulm and 9 miles downstream from Smith River. The drainage area is 20,941 square miles. Records are available from Aug. 1957 to date (1961). The maximum discharge for the period of record to Sept. 30, 1959 is 19,100 cfs (June 19, 1959) and the minimum daily, 1,900 cfs (Sept. 5, 1959). There are diversions for irrigation of about 610,000 acres above the station. The flow is regulated by 10 smaller reservoirs and power plants and Canyon Ferry Reservoir.

Missouri River near Great Falls*

Water-stage recorder determines head on gates, and meters determine discharge through power plant at Morony Dam, 10 miles northeast of Great Falls. Records are available from Oct. 1956 to date. The maximum daily discharge was 24,600 cfs (June 19, 1959) and the minimum daily 1,930 cfs (Aug. 29, 1959). The flow is regulated by 18 smaller reservoirs and power plants and Canyon Ferry Reservoir, which has a usable storage capacity of 2,043,200 acre-feet. There are diversions for irrigation of about 730,000 acres above station.

Smith River (Deep Creek) near Eden*

The water-stage recorder is a quarter of a mile upstream from Mullens (McMullen) Creek, 2 miles upstream from Hound Creek and 7 miles southwest of Eden. The drainage area is 1,594 square miles. Records are available from Apr. 1951 to date (1961). The maximum discharge was 12,300 cfs (June 4, 1953) and the minimum daily, 10 cfs (Dec. 8, 1958). The average discharge for 8 years (1952-59) was 273 cfs or 197,600 acre-feet per year. The highest annual runoff was 340,100 acre-feet (1953) and the lowest 126,200 acre-feet (1956). There are diversions for irrigation of about 30,720 acres above the station. Flow is affected by storage in Smith River Reservoir (usable contents, 10,700 acre-feet).

Smith River (Deep Creek) at Truly (Discontinued)

The wire-weight gage was at highway bridge at former post office at Truly, 6 miles southeast of Ulm and 6 miles upstream from mouth. The drainage area is 2,006 square miles. Records are available from Mar. 1905 to June, 1907 and Mar. 1929 to Sept. 1932. The maximum discharge observed was 8,800 cfs (June 24, 1907) and the minimum observed, 0.2 cfs (Sept. 10, 1931). There were diversions for irrigation of about 24,700 acres above the station.

Crown Butte Canal near Simms (Discontinued)

The staff gage was at the County road bridge 4½ miles west of Simms and about 7 miles downstream from headgates. Partial records are available from June to Sept. 1912. The maximum daily discharge observed was 37.3 cfs June 28-30; the minimum was not determined. The canal diverted from Sun River. There was no water diverted from the canal above the gage.

Sun River at Fort Shaw (Discontinued)

The water-stage recorder was at highway bridge at Fort Shaw. The drainage area is 1,475 square miles. Records from recorder are available from May 20, 1925 to Sept. 1928 and from nearby chain or staff gages from June, 1912 to May 19, 1925. The maximum discharge was 20,000 cfs (June 21, 1916), and the minimum observed, 38 cfs (Aug. 27, 1926). The average discharge for 13 years (1915-28) was 939 cfs or 679,800 acre-feet per year. The highest annual runoff was 1,280,000 acre-feet (1916) and the lowest 300,000 acre-feet (1919). There are numerous diversions for irrigation above and below the station and some regulation in Willow Creek Reservoir.

Sun River Canal near Sun River (Discontinued)

The staff gage was 1 mile northwest of Sun River and 1¼ miles downstream from headgates. Records are available from June to Oct. 1912. The maximum daily discharge was 81.4 cfs (Sept. 18) and the minimum, no flow at times. The canal diverts from Sun River. No water is diverted from the canal above the station.

Sun River at Sun River (Discontinued)

The staff gage was at the highway bridge at Sun River about 13 miles upstream from (Big) Muddy Creek. The drainage area is about 1,580 square miles. Records are available from Aug. 1905 to Sept. 1912. The maximum discharge was 27,200 cfs (June 7, 1908) and the minimum observed, 47 cfs (Sept. 14, 1906). The average discharge for 7 years (1905-12) was 1,130 cfs or 818,100 acre-feet per year. The highest annual runoff was 1,070,000 acre-feet (1907 and 1909) and the lowest 365,000 acre-feet (1906). There are numerous diversions for irrigation and regulation by several reservoirs above the station.

Sun River Canal at Vaughn (Discontinued)

The staff gage was about 1,000 feet upstream from point at which canal discharges into (Big) Muddy Creek and 1 mile northwest of Vaughn. Partial records are available for July and Aug. 1912. The maximum daily discharge was 17.6 cfs (Aug. 18) and the minimum, no flow at times. The canal diverts from Sun River. All water used from the canal was diverted above the station.

(Big) Muddy Creek at Vaughn*

The wire-weight gage and crest-state indicator are on old highway bridge at Vaughn and 1½ miles upstream from mouth. The drainage area is 314 square miles. Records are available from May 1925 to Feb. 1926 and Apr. 1934 to date (1961). The maximum discharge computed was 7,600 cfs (June 4, 1953) and the minimum observed, 4.9 cfs (Jan. 24, 1956). The flood of June 1908 reached a stage about 7 feet higher than that of June 1953. The average discharge for 25 years (1935-59) was 112 cfs or 81,080 acre-feet per year. The highest annual runoff was 122,500 acre-feet (1953) and the lowest 44,400 acre-feet (1936). There are diver-

sions for irrigation of about 667 acres above the station. Natural flow is increased by waste water from Sun River Canal and by return flow from irrigation. The irrigated acreage figure excludes Teton County irrigation.

Sun River near Vaughn*

The water-stage recorder is 4 miles downstream from (Big) Muddy Creek, 4 miles southeast of Vaughn and 13 miles upstream from mouth. The drainage area is approximately 2,200 square miles. Records are available from Apr. 1934 to date (1961). Gage heights and discharge measurements only were obtained July to Oct. 1897. A staff gage was used Apr. 19 to Aug. 3, 1934. The maximum discharge was 17,900 cfs (June 4, 1953) and the minimum 21 cfs (May 10, 1941). The average discharge for 25 years (1935-59) was 726 cfs or 525,600 acre-feet. The highest annual runoff was 946,300 acre-feet (1943) and the lowest 152,000 acre-feet (1941). There are diversions for irrigation of about 110,000 acres above the station. Flow is regulated by Gibson, Pishkun, Willow Creek and Nilan reservoirs which have a total usable capacity of 179,400 acre-feet.

Belt Creek near Monarch*

The water-stage recorder is half a mile south of Riceville and 9 miles northwest of Monarch. The drainage area is 368 square miles. Records are available from Apr. 1951 to date (1961). The maximum discharge was 11,000 cfs (June 4, 1953) and the minimum daily 2 cfs (Jan. 3 and 4, 1957). The average discharge for 8 years (1952-59) was 147 cfs or 106,400 acre-feet per year. The highest annual runoff was, 203,400 acre-feet (1953) and the lowest 49,620 acre-feet (1956). There are diversions for irrigation of 183 acres above the station.

Belt Creek near Belt (Discontinued)

The chain gage was at highway bridge, half a mile upstream from Big Willow Creek, 8 miles north of Belt, and 16 miles upstream from mouth. The drainage area is 686 square miles. Records are available from Mar. 1905 to Nov. 1906. The maximum discharge observed was 2,050 cfs (June 12, 1906) and the minimum, no flow at times. There were some diversions above the station for irrigation.

Partial Record Stations and Miscellaneous Discharge Measurements

In order to provide information on more streams than are covered by stream gaging stations, the Geological Survey has for several years been collecting some partial records. These are in addition to the miscellaneous discharge measurements which have always been reported. These partial records when correlated with simultaneous discharges of nearby continuous-record stations give fair indications of available flow.

There are about a dozen low-flow and about fifty crest-stage partial-record stations in the Missouri Basin in Montana. A number of them have been in operation since 1955 or 1956, but more of them were started in 1958 or 1959. There are three crest-stage partial-record stations in Cascade County.

These partial-record stations as well as the miscellaneous discharge measurements are reported in lists at the end of each U. S. Geological Survey Water Supply Paper.

* These gaging stations are now in operation (1961).

MINING

Rocks exposed in Cascade County span the geologic column from pre-Cambrian to Recent. Most of the County is underlain by flat-lying sedimentary rocks of the Cretaceous system. Associated with the Kootenai formation of this system are the extensive coal fields near Belt, Sand Coulee, and Armington, and along Hound Creek, whereas other rocks of this system, the Colorado group north of Great Falls, contain shales suitable for expansion and the making of light-weight concrete aggregate.

Erosion of dome-shaped uplifts in the Little Belt Mountains has exposed pre-Cambrain gnesses and schists that are surrounded by younger Cambrian formations. Most of the metallic mineral deposits known to Cascade County are associated with igneous rocks that have intruded these older formations. Volcanic rocks are exposed in the far eastern and southeastern parts of the County.

Metals

Silver is the metal that sparked the metal mining activities of Cascade County. The discovery in 1879 of silver-lead deposits near Barker, now mainly in Judith Basin County, and similar discoveries in 1881 near what is now the town of Neihart started the mining boom. As might be expected the discoveries at Barker were made by Buck Barker and others and the discoveries at Neihart were made by J. L. Neihart and others.

Gold had been discovered in about 1863 in the gravels of Yogo Gulch, an area later included in Judith Basin County. The same deposits were rediscovered in 1879, but neither discovery proved to be profitable until in later years when the presence of sapphire in Yugo Gulch was recognized.

Because the ores at Barker (then called Clendennin) and Neihart were predominantly silver ores, the fluctuation in price of this precious metal was mirrored by the district mining activities. The initial surge of production was of high-grade ore that was shipped to Swansea, Wales, for smelting. Transportation was by way of pack horses, mule and horse—or oxen-drawn wagons to Fort Benton and then by river steamer to Kansas City, St. Louis or New Orleans and finally to Wales. Several shipments, reportedly, yielded $200 per ton in metal values even after deducting $100 a ton for freight and smelter charges. Smelters were soon built at Hughesville and Clendennin (Barker). The first was unsuccessful but the second operated until 1893 and produced bullion valued at $375,000. By 1888 smelters had been erected at Great Falls and Helena, and a concentrator and smelter was put into operation at Neihart. However, depletion of high-grade ores coupled with high transportation costs forced closure of most of the mines.

Completion of a branch line to Neihart by the Great Northern Railroad spurred the mining industry anew in 1891, but the activity was shortlived. In 1892 the demonetization of silver caused the price to drop and mining again waned. Intermittent production and several unsuccessful concentrating attempts marked the years between 1895 and 1915. In 1915 the price of silver started to rise as did mining activity, but the better market was not alone responsible. Selective flotation processes were developed about this time making it possible to mine and concentrate low grade ores. When the price of silver slumped again in 1919 a few of the larger mines continued to produce because of the improved concentrating processes whereby suitable prices could be received for copper, lead, and zinc concentrates. The

depression years of the early 30's forced the silver price to less than 30 cents; almost all mines closed. After the price of silver was fixed in 1934 and raised in 1935, mining again became prominent and continued to flourish through the stable-price years of World War II.

Metal prices of lead and zinc sank in 1949 and during the recession of 1958 and 1959. Cascade County's metal mining industry has not as yet recovered from the effects. Although production data is very spotty prior to 1900, it has been estimated that from 1889 to 1959 Cascade County produced over $21,000,000 worth of gold, silver, copper, lead, and zinc. Furthermore, it is believed that production prior to 1889 was sizeable.

Montana (Neihart) District

As implied by the name, the Neihart District is centered at the town of Neihart. Most of the mines are within 1 to 3 miles of the town.

Ore deposits occur principally as veins in gneisses or schists or at the contact of these rocks with later intrusives. The veins, which are usually persistent laterally and vertically, carry a high silver content near the surface, but deeper levels encountered lower precious metal content and larger quantities of lead and zinc.

Most productive of the many mines in the District are the Broadwater, Moulton Florence, Hartley, Queen of the Hills, Galt, Star, Equator, Dacotah, Silver Belt, Black Bird, Broken Hill, Fairplay, Ingersoll, Champion "B", Peabody, Benton, Big Seven, Lexington, Ripple, Tom Hendricks, Eureka, Mountain Chief, Silver Dyke, Graham and Hollowbush.

The Big Ben molybdenum mine, about 1½ miles northeast of Neihart, has been prospected by the U. S. Bureau of Mines and several large mining companies. Molybdenum minerals along with pyrite, galena, chalcopyrite and fluorite, occur disseminated through porphyritic rhyolite, but there is no recorded production.

Barker District

Prior to 1920 all of the Barker District was included within Cascade County. However, with the formation of Judith Basin County in 1920, most of the mines and prospects were included in the new County.

The Barker District is centered around the town of Barker at the headwater of the Dry Fork of Belt Creek. Ore deposits occur as replacements in limy beds in contact with porphyritic granite. The Fairplay, Bon Ton, and the Silver Bell mines are the only productive properties in the Cascade County portion of the Barker District. Valuable products as in the Neihart District, are silver and lead with lesser amounts of zinc, copper, and gold.

Carbonate (Logging Creek) District

This District, covering an area of about 10 square miles, is near the head of Logging Creek, about 14 miles northwest of Neihart. The ore deposits, which are usually small, occur in metamorphosed zones of sedimentary rock near igneous rocks or in fractured limestones at some distance from the intrusive rocks.

Because of the narrow veins, little production has been recorded; however, the Nelson, Gavander and Copes properties were prospected for silver and lead. Of the three, the Copes Mine was the only producer.

Thunder Mountain District

An area on the north slopes of Thunder Mountain, about 3 miles southwest of Monarch, has been prospected for iron-ore deposits. The iron deposits are replacements of sedimentary rocks in contact with porphyritic granite. Limonite, hematite, and magnetite are the principal ore minerals.

The Albright and the Hurricane and Tornado claims are developed more extensively than other claims in the area, but no production is recorded.

Coal

Surprisingly the earliest recorded coal mining in Cascade County was done in 1876 near Belt, three years before the first discovery of metal-bearing lodes near Barker. Since that time, until the completion of natural gas lines from the Cut Bank field, coal mining was the most profitable and extensive mining industry in the County. It is estimated that the total output of bituminous coal is about 36 million tons, valued at about 66 million dollars.

Most productive and largest of several coal fields in the County is the Great Falls field. It occupies an extensive area southwest, south, and southeast of Great Falls. The coal occurs in the Belt Creek bed, formerly assigned to the Kootenai formation, but which has recently been assigned to the Morrison formation. The Anaconda Mine at Belt, the Cottonwood Mine at Stockett, the Nelson and Gerber mines at Sand Coulee, and the Carville Mine on Hound Creek, near the Smith River, were the main producers. Small-scale and intermittent producers were the East Belt, Latham, Surmi, and Loveland Mines.

Railroads, within the State, consumed most of the coal. Local smelters, other industries and homes consumed the remainder of production.

The Valier coal field in the northwest corner of the county contains two coal beds of mineable thickness, however, the coal is low-ranking bituminous coal and production has been very small.

Nonmetals

Cascade County has paralleled the course followed by most mining counties in the State during the last three decades. As metal mining declined, nonmetal production increased. This increase is allied to the accelerated activity in defense installations, public works housing, highways, and private businesses that require tremendous quantities of sand, gravel, and stone. During 1957 and 1958 Cascade County ranked first in nonmetal production in the State; it ranked second in 1959. Nonmetallic minerals other than sand, gravel and stone have not been extensively produced in Cascade County. Limestone, expandable shale, fire clay, gypsum, bentonite, and building stone have been produced in relatively small quantities.

Limestone was quarried prior to 1945 from Belt Creek Canyon. It was used in the Great Falls smelter and the sugar factory at Chinook. Removal of the Great Northern branch line from Armington to Neihart forced the quarry to close.

Fire clay is mined intermittently from a 5-foot bed about one-half mile northeast of Armington. The clay is used in the copper and zinc refining plants of the Anaconda Company in Great Falls and at the smelter in Anaconda.

Between 1908 and 1915 gypsum was mined from a deposit about 1 mile east of Riceville. The gypsum was processed into plaster at Great Falls and it found markets as far off as Seattle, Washington. Because of the irregular width of the gypsum bed and leasing difficulties, work on the deposit was stopped. Another gypsum deposit about 3 miles north of Riceville was prospected in 1900, but the deposit proved to be very irregular, and no commercial production was recorded.

Near Vaughn a 5-foot bed of bentonite is exposed. In general the clay is of poor quality, but small amounts have been mined and used by local farmers and ranchers for lining irrigation ditches.

A hard, dense sandstone, which occurs near Belt and Armington, has been used in construction of a few buildings in the near vicinity.

Recently an expanding plant was built north of Great Falls for making lightweight aggregate and pozzolan from expanded shale. Clay deposits at Sand Coulee and Tracy were mined until 1956 for manufacturing structural brick and tile.

SOIL CONSERVATION DISTRICT

The Cascade County Soil Conservation District, through a series of consolidations, now comprises the whole of Cascade County, 1,701,760 acres.

In 1944, the Sun River District was organized covering the irrigated land along the Sun River. The original area was 18,800 acres, but this was increased to 127,654 acres by five additions in 1945 and 1946. It included portions of Lewis & Clark and Teton counties. In 1946, the balance of Cascade County was organized as the Cascade County Soil Conservation District. During 1959, the portion in Teton County was apportioned to Teton County Soil Conservation District. In 1960, the Sun River Soil Conservation District was consolidated with the Cascade County SCD. In 1961, the portion in Lewis & Clark County was joined with the Lewis & Clark SCD. There are now 1,033 farms of which 576 are District Cooperators.

The purpose of the Cascade County Soil Conservation District, as stated in the District Work Program, is "to enable us to pass on to those who come after us, soil as good as we received, together with an understanding of the best methods of conserving it. It also aims to help make farm life more pleasant and attractive."

To achieve the purpose of the District, farmers and ranchers need: Increased amounts of wind stripping, contour stripping and stubble mulching in the dry cropland areas; intensified use of deferred grazing, proper stocking, water developments, and related practices on the range lands; increased use of soil conserving crops, irrigation water management, and drainage on the irrigated lands; conversion of marginal cropland back to hay and pasture, and increased noxious weed control activities. The Board of Supervisors of the District is

working with all Federal, State, and County agencies and with individual and farm groups to achieve a complete soil and water conservation program.

The major irrigated areas are located along the Sun River and Missouri Rivers. Where feasible, small individual irrigation systems have been installed adjacent to Belt Creek, Hound Creek, and Smith River. Most of the irrigated land on the flood plain of the streams have a land capability of Class I and II. The sloping lands adjoining the alluvial plain have a land capability ranging from Class II to IV according to slope on soil type.

Since 1944, when the Sun River SCD was organized, 2,996 acres of new land have been brought under irrigation. Irrigation systems have been developed and improved by the leveling of 8,657 acres, the construction of 485 miles of main and field ditches, the installation of 2,432 ditch structures, and the installation of improved irrigation methods on 14,882 acres. Conservation cropping systems have been established over 25,437 acres. To remove excess water on 5,765 acres, a total of 56 miles of ditch has been constructed.

Most of the cropland (93%) in the District is dry farmed. Small grains are normally grown in a grain-summerfallow rotation. To protect the land from wind erosion, 221,073 acres are laid out in wind strips. Contour strips have been established on 1,767 acres.

Nearly half of the District is rangeland. The range sites vary from Silty to Very Shallow and from Sands to Dense Clay. Proper stocking is being practiced on 232,602 acres and 72,312 acres of range has been rested from grazing. Livestock water is scarce in many areas and is needed to obtain uniform use of the range. A total of 467 dams, 77 wells, and 182 springs have been developed through District assistance.

Cascade County was designated as a participating County under the Great Plains Conservation Program on July 10, 1959 by the Secretary of Agriculture. This program is available to farmers and ranchers desiring a long term, cost-sharing plan to accomplish land use change, wind and water erosion control, and moisture conservation practices.

The Cascade County Soil Conservation District is a legal subdivision of the State of Montana and was organized under the Soil Conservation Act of 1939, which provides for voluntary action, home rule, and the protection of the individuals rights and independence. The District is governed by a Board of Five Supervisors elected by the land occupiers of the District. They carry out a program of soil erosion control, water conservation, soil fertility management, and proper land use. In furtherance of the program, they request assistance from Federal, State, and local agencies.

Direct, on-site technical assistance is provided to District co-operators by the Soil Conservation Service through the District. Soil Conservation Service technicians make the necessary soil, range and engineering surveys to provide basic resource data for development of District and Great Plains Conservation Plans. The SCS technicians assist the farmer or rancher in the development of his Conservation Plan by interpreting surveys, advising about limitations and hazards of land use and recommends needed treatments. With this assistance, the operator plans the conservation treatment of his unit. Necessary technical assistance is provided to accomplish needed conservation treatments. Cost-sharing is provided to make needed adjustments and to apply conservation practices for units under a Great Plains contract. Cost-sharing is available through the Agriculture Conservation Program for other farms qualifying for assistance.

The goal of the Cascade County SCD is to "use each acre according to its capability and to treat each acre according to its needs." To this end, there has been outstanding co-operation from owners and operators, Federal, State, and local agencies and individual groups. The Soil Conservation Service, County Agent, Agriculture Conservation Program, and Farmers Home Administration have been particularly helpful in furtherance of the District Program.

FISH AND GAME

Many fine trout waters are found in Cascade County. The most important, the Missouri River, is a very productive stream enjoying a national reputation as a fine trout stream from the Giant Springs area at Great Falls on upstream. Below Great Falls good sauger and walleye fishing is provided by this river. Smith River, Belt Creek, and Hound Creek are among the better trout streams in this area. At one time excursion trains ran from Great Falls up Belt Creek because of its popularity as a fine trout stream. Mining pollution and channel changes due to highway construction, have seriously reduced the fish habitat in this fine stream. There are a number of good trout reservoirs on ranches in Cascade County which provide excellent fishing.

The State Fish Hatchery located at Giant Springs near Great Falls takes care of trout stocking for those waters in North Central Montana that are lacking natural reproduction.

The presence of the Missouri, Sun, and Smith rivers, plus a number of ponds and reservoirs make this area moderately important from the waterfowl production and hunting aspects. The U. S. Fish and Wildlife Service is developing an important waterfowl area at Benton Lake north and west of Great Falls. Water for this project will be taken from Muddy Creek which flows from the Fairfield Bench. Both mule and white-tailed deer are found in the County. The mule deer for the most part range in the upper breaks areas while the white-tailed deer are found along the brushy river bottoms. An important plant of bighorn sheep has been made southeast of the town of Cascade in the Sheep Creek-Stickney Creek area. Elk are found in the Highwood Mountains, a portion of which lies in this County, and also in the Stickney Creek region.

LEWIS & CLARK NATIONAL FOREST

Cascade County, so named because of the numerous cascades in the Missouri River, was formed in 1887 from portions of Meagher, Lewis & Clark, and Chouteau counties. Many changes have taken place in north central Montana since 1805 when Lewis and Clark journeyed up the Missouri River to the unexplored West. Much of the lower country has undergone a complete change with its irrigated tracts, wheat fields, towns, fences, herds of cattle, bands of sheep, and other man-made changes. But the mountain ranges that can be seen from the lower country are the same as when first observed by the explorers. They did not dream that these mountains, whose snowy tops shone before them, would one day be included in a national forest which would bear their names, "Lewis and Clark."

The headquarters of the Lewis and Clark National Forest is located in Great Falls, the county seat of Cascade County. The forested area within the County is located mainly in the southern portion in the Belt Mountains. A small forested area in the eastern portion of the County is in the Highwood Mountains. The Belt Mountains were established as a forest re-

serve by Presidential Proclamation in 1902. The following year another proclamation created the Highwoods as a forest reserve. Both areas were transferred to the Jefferson National Forest in 1908 and with other areas were consolidated in the present Lewis and Clark National Forest on April 8, 1932.

With a gross land area of slightly more than 1.7 million acres, Cascade County has approximately 319,000 acres, or 19 per cent of its area, in forests. Of this, three-quarters, or 236,000 acres, are classified as commercial forest land, designated as areas capable of producing commercial timber and economically accessible now or prospectively. The remaining 83,000 acres are noncommercial, or valuable for purposes other than timber production. The Lewis and Clark National Forest includes nearly 55 per cent of the forest land in Cascade County. Small private owners possess the next largest forest area. They have nearly 98,000 acres in contrast to the national forest with 178,000 acres. The State and County together own about 17,000 acres.

The basic resources are timber, water, and soil. The management of the watersheds is inseparably a part of the management of all the resources; the soil, plants, grass, trees, and water itself. The water produced in the national forest is of great value locally and at great distances from its source. Without soil, the water would be of no value to promote the growth of plants. The national forest multiple-use policy correlates the harvest of natural resources such as forage, timber, and wildlife to obtain sustained flows of water with a minimum of soil loss.

Of the 211,000 gross acres of forest land in the national forest in Cascade County, 34,000 acres, or 16 per cent, are in private ownership. All ownership within the national forest boundary in Cascade County has 450,000,000 feet, board measure, Scribner scale, of sawtimber. Eighty-six per cent is in Government ownership. Douglas-fir comprises 44 per cent of the total volume of sawtimber, followed by lodgepole pine with 135,000,000 feet, or 30 per cent, then spruce, alpine fir, and ponderosa pine. The sawtimber distribution by species on the private land is 42 per cent lodgepole pine and 34 per cent Douglas-fir. Cordwood trees, more than 5.0 inches d.b.h. but less than sawtimber size (11.0 inches d.b.h.), approximate 100,000,000 cubic feet, or about 1,100,000 cords. Of this total, 55 per cent is lodgepole pine and 24 per cent Douglas-fir.

Until recent times, lodgepole pine was relatively unimportant as a commercial product. At present, increasing use is being made of it as sawlogs for the production of lumber. Increase in harvesting of this species can be anticipated in the future. At the same time, considerable volumes can be expected to be used for pulpwood.

Insects and diseases are exacting a heavy toll of the timber supply. The infestation of spruce budworm in the Douglas-fir became serious in 1955. Aerial spraying of concentrated infested areas was made in 1956 and 1957. Nearly all stands of Douglas-fir in the Belt Mountains are infested at present. To be effective, all timber regardless of ownership should be sprayed. The private landowners must agree to assume a portion of the cost prior to spraying, but many of them have not been willing to assume such costs. It is conservatively estimated that 10 per cent of the merchantable Douglas-fir timber has been killed to date by this epidemic. A higher rate of loss per year can be anticipated in the future if control measures are not completed. The loss of the Douglas-fir cover through continued spruce budworm infestation will have the greatest impact on the watersheds in the timbered areas within Cascade County.

The national forest area has heavy recreational use, with 62,000 visitors in 1960. It contains three organization sites, three campgrounds with 29 picnic tables, and 46 summer home residences. It is anticipated that 247,000 recreation visits will be made on the area by the year 1975 and 599,000 visits by the year 2000.

There are 1,450 cattle grazing on 15 allotments for a total of 6,000 animal months and 6,400 sheep on 10 allotments for 13,900 animal months. In addition, the area supports elk, white-tailed deer, mule deer, bear, and moose. The national forest acreage in Cascade County is rated as above average hunting area by many hunters.

Fire, next to insects and diseases, is the forest's worst enemy. The gross area within the Forest Service fire protection area has averaged six fires during the past five years. Size classes are four fires of ¼ acre or less, 1 fire of ¼ acre to 10 acres, and 1 fire to 10-100 acres. The area has averaged 1 man-caused fire per year. The burned-over acreage averages 13 acres per year.

Silver mining in the Neihart, Barker and Hughesville areas was active in the early 1900's. At present, ore production has practically ceased. The settling basin and discharge of mining wastes have impaired the fish habitat, especially in Carpenter Creek, the Dry Fork of Belt Creek, and Belt Creek. The above-normal high water in 1953 also resulted in stream scouring, channel changes, and considerable stream bank erosion in Belt Creek, Logging Creek, and Ming Coulee.

SUMMARY OF IRRIGATED LAND BY RIVER BASINS IN THE FOLLOWING COUNTIES COMPLETED TO DATE

Big Horn, Broadwater, Carbon, Carter, Cascade, Custer, Deer Lodge, Fallon, Gallatin, Golden Valley, Granite, Jefferson, Lewis & Clark, Madison, Meagher, Missoula, Musselshell, Park, Powder River, Powell, Ravalli, Rosebud, Silver Bow, Stillwater, Sweet Grass, Treasure, Wheatland, Wibaux and Yellowstone

RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Missouri River Drainage Basin			
***Missouri River**	79,568.50	19,137.50	98,706.00
Jefferson River	61,291.00	9,713.00	71,004.00
Beaverhead River	40,771.00	6,076.00	46,847.00
Big Hole River	23,775.00	1,950.00	25,725.00
Madison River	39,445.00	7,660.00	47,105.00
Gallatin River	111,914.00	21,097.00	133,011.00
Smith River	32,934.00	19,679.00	52,613.00
Sun River	46,412.23	3,406.00	49,818.23
Musselshell River	64,789.00	57,870.00	122,659.00
Little Missouri River	42,332.00	1,499.00	43,831.00
Grand Total Missouri River Basin	**543,231.73**	**148,087.50**	**691,319.23**
Yellowstone River Drainage Basin			
Yellowstone River	303,501.00	96,148.00	399,649.00
Stillwater River	27,489.00	16,403.00	43,892.00
Clark Fork River	91,768.00	24,195.00	115,963.00
Big Horn River	65,395.00	25,579.00	90,974.00
Tongue River	28,170.00	7,762.00	35,932.00
Powder River	35,948.00	2,299.00	38,247.00
Grand Total Yellowstone River Basin	**552,271.00**	**172,386.00**	**724,657.00**
Columbia River Drainage Basin			
Clark Fork (Deer Lodge, Hellgate, Missoula) River	145,804.70	14,934.20	160,738.90
Bitterroot River	111,102.43	3,200.00	114,302.43
Grand Total Columbia River Basin	**256,907.13**	**18,134.20**	**275,041.33**
Grand Total in the Counties Completed to Date	**1,352,409.86**	**338,607.70**	**1,691,017.56**

* Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF CASCADE COUNTY BY RIVER BASINS

MISSOURI RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
***Missouri River**	4,588.50	1,516.50	6,105.00
Hardy (Schofield) Creek	40.00	0	40.00
Spring Creek	31.00	0	31.00
Tintinger Slough	86.00	0	86.00
Harris Creek	162.00	0	162.00
Boston (Allin) Creek	142.00	0	142.00
Antelope Creek	73.00	97.00	170.00
Knapp Creek	14.00	0	14.00
Unnamed Coulee	0	45.00	45.00
Unnamed Coulee	7.00	0	7.00
Gravel Pit	50.00	0	50.00
Bird Creek	434.00	253.00	687.00
Little Bird Creek	0	15.00	15.00
Boston Creek	46.00	0	46.00
Huff Creek	44.00	0	44.00
Willow Creek	228.00	81.00	309.00
East Fork Willow Creek	54.00	0	54.00
Little Muddy Creek	589.00	0	589.00
St. Johns (Mission) Creek	98.00	0	98.00
Unnamed Coulee	0	114.00	114.00
Rocky Gap (Lepley) Creek	1,049.00	448.00	1,497.00
Unnamed Coulee	11.00	0	11.00
Total Little Muddy Creek and Tributaries	**1,747.00**	**562.00**	**2,309.00**
Smith River (Deep Creek)	345.00	668.00	1,013.00
Trout Creek	71.00	0	71.00
Mullens (McMullen) Creek	0	339.00	339.00
Hound Creek	805.00	0	805.00
East Fork Hound Creek	67.00	0	67.00
Middle (East Fork Hound) Creek	792.00	259.00	1,051.00
West Fork Middle Creek	231.00	0	231.00
Elk Creek	160.00	0	160.00
Windy Hollow (East Fork Hound Creek)	0	0	0
Bear Creek	23.00	0	23.00
Spring Creek	78.00	0	78.00
Encampment (Camp) Creek	58.00	0	58.00
West Fork Hound Creek	0	0	0
Allen Creek	0	15.00	15.00
Total Smith River (Deep Creek) and Tributaries	**2,630.00**	**1,281.00**	**3,911.00**

* Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF CASCADE COUNTY BY RIVER BASINS

MISSOURI RIVER BASIN—(Continued)	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Sun River	18,360.91	783.00	19,143.91
North Fork Sun River	16,000.00	0	16,000.00
Simms Creek	0	47.00	47.00
Springs	0	40.00	40.00
Sumps & Drain	0	64.00	64.00
Springs	64.00	0	64.00
Unnamed Coulee	101.00	0	101.00
Huber Coulee	29.00	0	29.00
Big Muddy Creek	351.00	141.00	492.00
Briggs Coulee (or Creek)	61.00	0	61.00
Springs & Reservoirs	50.00	18.00	68.00
Horseshoe Slough	135.00	0	135.00
McIver Creek	70.00	0	70.00
Total Sun River and Tributaries	**35,221.91**	**1,093.00**	**36,314.91**
Box Elder Creek	0	0	0
Spring Creek	40.00	0	40.00
Belt Creek	183.00	28.00	211.00
Dry Fork Belt Creek	0	0	0
Smoke In The Hole Creek	0	39.00	39.00
Tillinghast Creek	0	0	0
Unnamed Stream	0	14.00	14.00
Otter Creek	30.00	11.00	41.00
Brigman (Spring) Coulee	10.00	0	10.00
Anderson (Ford) Coulee	4.00	0	4.00
Marion Coulee	20.00	0	20.00
Cora Creek	93.00	0	93.00
Total Belt Creek and Tributaries	**340.00**	**92.00**	**432.00**
Total Irrigation in Cascade County	**45,978.41**	**5,035.50**	**51,013.91**

THE ROCKY REEF DITCH COMPANY

HISTORY

Among the earliest water users under this ditch company were; Thomas P. Quinn, Henry P. Hinrichsen, Charles Mize, James Blair, Frank Bird, and S. B. Robbins.

Articles of incorporation of The Rocky Reef Ditch Company were first filed on February 22, 1916 for a period of 40 years. On October 26, 1959, a stockholders meeting was held to extend the charter of the ditch company for a period of continual existence. The number of shares of stock in the company total 254, with all of the shares subscribed to at the present time (1961). The stock of this corporation is assessable.

PRESENT STATISTICS

Location: Lands irrigated by The Rocky Reef Ditch are supplied water from the Sun River and are located in the NW¼ of section 1, N½ of section 2, and section 3, T. 20N., R. 2W.; and the S½SE¼SE¼ of section 34, S½S½ of section 35, SE¼ of section 36, T. 21N., R. 2W.

Length and Capacity of Canal: The ditch is a direct diversion from the Sun River diverting from the left bank in the SE¼NE¼ of section 4, T. 20N., R. 2W. Its total length is about 2¼ miles, with an initial capacity of 25 cubic feet per second.

Operation and Maintenance: Water charges for operation and maintenance are assessed to the stockholders according to the number of shares of stock owned in the company. These assessments vary from year to year. One share of stock represents 3.15 miner's inches of water.

Present Users: Water users under this ditch company in 1960 totaled six. Their names and number of shares owned are as follows: Stanley Stelling — 52 shares, Ruby & Walter Savoy—52 shares, Roy Rammel—25 shares, Sam Lenz—73 shares, Roy Maney—26 shares, and Kathryn Hoffman—26 shares.

Acreage Irrigated: During the year of 1960, there were 510 acres irrigated, with no potential irrigable acreage under the ditch facilities.

WATER RIGHT DATA

The source of water for The Rocky Reef Ditch Company is from the Sun River, which was adjudicated by court decree on June 13, 1911. All of the appropriative water rights that are used by the ditch company were filed on after the Sun River adjudication. The late priority dates of the appropriations owned by The Rocky Reef Ditch Company does not necessarily limit the water supply to only flood water. Due to the location of the ditch diversion, below most of the decreed water rights on the Sun River, the return flow to the stream from irrigation above supplies enough water in normal years for the irrigation of their lands during the year.

The appropriative water right filings that are owned and used by The Rocky Reef Ditch Company are as follows: An appropriation made by James Blair, dated December 11, 1912 for 200 miner's inches (Ref. Book IV, Water Right Records, Page 493); an appropriation by

Henry P. Hinrichsen, dated December 11, 1912 for 200 miner's inches (Ref. Book IV, Water Right Records, Page 465); an appropriation by Thomas P. Quinn, dated June 20, 1912 for 200 miner's inches (Ref. Book IV, Water Right Records, Page 512); and an appropriation by James Blair, dated December 11, 1912 for 200 miner's inches (Ref. Book IV, Water Right Records, Page 466). All of the above water right filings may be found in the County Clerk and Recorder's Office, Great Falls.

(See Maps in Part II, Pages 23 and 28).

SUN RIVER VALLEY DITCH COMPANY

HISTORY

The early history of this ditch began in the year of 1868, when Robert Ford and Robert Vaughn constructed a ditch from the Sun River and took out a water right for the irrigation of some wheat to supply a flour mill on Mill Coulee Creek. In the years to follow the ditch was extended and enlarged to include other farms down the valley.

The Sun River Valley Ditch incorporated as a company on March 31, 1921 for a term of 40 years. Capital stock in the company amounts to $48,600, divided into 4,050 shares at a par value of $12.00 each.

This irrigation project is located in lower Sun River Valley, between the towns of Sun River and Vaughn. Lands in the project are traversed by the Augusta — Great Falls branch of the Great Northern Railway and by State Highway No. 20. Great Falls is only fifteen miles distant and affords a good market for a variety of farm products.

PRESENT STATISTICS

Location: Lands irrigated under this project are situated in section 25, S½ of section 26, S½S½ of section 27, S½S½ of section 28, N½ of section 33, N½N½ of section 34, N½ of section 35, and the N½N½ of section 36, T. 21 N., R. 1 W.; the S½ of section 20, S½ of section 21, S½ of section 23, S½ of section 24, section 25, N½ of section 26, N½ of section 27, sections 28, 29, and 30, and N½NW¼ of section 33, T. 21 N., R. 1E.

Length and Capacity of Canal: The main canal has its point of diversion on the left bank of the Sun River in SE¼NW¼ of section 32, T. 21 N., R. 1 W. It has an over-all length of 11½ miles, with an initial capacity at the headgate to carry 75 cfs of water.

Operation and Maintenance: Usually the $1.00 assessment per share of stock is more than enough each year for operation and maintenance. The balance, after expenses are paid, is placed in a reserve fund to accumulate for any unforeseen emergencies that may arise, thus eliminating special assessments.

Present Users: Under this ditch company last year there were 43 stockholders owning all of the 4,050 shares of stock issued. The stock shares are owned and divided among the stockholders in various amounts, from 1 share to 400 shares by the largest stockholder. When any of the stock in this Company is sold, the shareholders have the first chance to

buy the shares that are for sale. One share of stock is equivalent to .622 miner's inches of water.

Acreage Irrigated: In 1960, there were 3,199 acres irrigated and 509 acres more irrigable under the existing ditch system.

WATER RIGHT DATA

The Company has an adjudicated water right from the Sun River, which is with one exception, the oldest right on the river. This right was decreed to the Sun River Valley Ditch Company, in the amount of 1,840 miner's inches, having a priority date of May 1, 1868, and 640 miner's inches, dated May 1, 1902. (Ref. Sun River Decree, Case No. 4742, dated June 13, 1911 in Judgment Book 6, Misc. Records, pages 1 - 232, Clerk of the Court's Office, Great Falls).

(See Maps in Part II, Pages 25 and 27).

SUN RIVER PROJECT, U. S. BUREAU OF RECLAMATION

FORT SHAW IRRIGATION DISTRICT

HISTORY

This irrigation District is located in the northwestern part of Cascade County and extends easterly from the town of Simms through Fort Shaw to the town of Sun River. Its area almost coincides with the old Fort Shaw Military Reservation.

During the summer of 1890 an irrigation ditch to Fort Shaw was built and water diverted from the river in section 11, T. 20 N., R. 3 W. The capacity of the canal was 15 cfs and was used to irrigate the garden and wild hay land around the Fort until the summer of 1891 when the garrison was abandoned.

On June 17, 1902, the Act providing for the irrigation of public lands—commonly known as the Reclamation Act—was passed by the Congress of the United States. On June 9, 1906, an Act was passed to provide for the use, under the Public Land Laws, of the land in the abandoned Fort Shaw Military Reservation, and these lands were withdrawn for irrigation development on September 20, 1906.

Preliminary surveys of the Fort Shaw division began in 1905 and the project authorized for construction on February 26, 1906. Construction was completed in December of 1909.

PRESENT STATISTICS

Location: The diversion canal diverts from the right bank of the Sun River in the SE¼SE¼ section 2, T. 20 N., R. 4 W., crossing Simms Creek in section 15 of T. 20 N., R. 3 W., and irrigates land south of the river in T. 19 N., R. 2 W.; Township 20 North, Ranges 1, 2, and 3 West; and T. 21 N., R. 1 W.

Considerable damage was done to the system by the floods of 1916, and 1953, causing bank erosion above the headworks. Under a special Act of Congress, $48,000 was furnished to place rock rip-rap to control this bank erosion.

In 1959 the District obtained $100,000 of Rehabilitation and Betterment funds to improve the District works. From the original amount, $10,000 was used to place a rock diversion dam across the river channel and the balance will be used to replace old structures and to build additional facilities. This money will be repaid to the Bureau of Reclamation over a period of years.

Length and Capacity of Canals and Reservoir: The main canal has an initial capacity of 290 cfs. It is 12.1 miles in length and the distribution system consists of 89 miles of laterals. In addition to its direct flow water rights, the District has a storage interest of 5,400 acre-feet in the Willow Creek Reservoir located northwest of Augusta. This is one third of the original capacity of the reservoir, the remaining two thirds being for the use of the Greenfields Division, a part of the Sun River Project lying on the north side of the river. Later the reservoir was enlarged by raising the dam. This work was charged entirely to the Greenfields Division and the Fort Shaw District has no interests in this additional storage.

Operation and Maintenance: Water charges for 1960 for operation and maintenance were $2.25 per acre, which entitled the farmer to two acre-feet of water per acre.

Present Users: During the irrigation season of 1960 there were 149 water users under the District.

Acreage Irrigated: In 1960 there were 10,055 acres irrigated from the District's canal system and 18 acres irrigable from present facilities.

WATER RIGHT DATA

The water rights that are appurtenant to the Fort Shaw Irrigation District also apply to the Greenfields Irrigation District and are used in conjunction with both canal systems. For the water right information of the Fort Shaw Irrigation District refer to the water right data of the Greenfields Division.

(See Maps in Part II, Pages 22, 23, and 24).

GREENFIELDS IRRIGATION DISTRICT

HISTORY

This District is located north of the Sun River and extends from the Choteau — Augusta Highway eastward to Muddy Creek. It lies in both Cascade and Teton counties. The total irrigated acreage in the District in 1960 was 78,600 acres. Of this total 15,860 acres lies in the northwest part of Cascade County.

In 1884 a ditch was started to divert water from the North Fork of the Sun River in section 28, T. 22 N., R. 7 W. to carry water to the Greenfields Bench, but difficulty was encountered and this ditch was abandoned. In 1889 engineers of the United States Geological Survey began preliminary surveys for the canal line. In 1902 Desert Claims were filed on the Greenfields Bench and the Kilraven Co-operative Canal Company attempted to take water to the lands, but they were not successful in doing so.

On October 17, 1903, the newly organized Reclamation Service withdrew Public Lands to incorporate them into the Sun River Project and public notices of lands opened for irri-

gation settlement were made on March 26, 1908; November 18, 1910; March 28, 1911; March 2, 1912; and July 13, 1912. The Desert Claims were included in this plan.

The initial irrigation system provided for the storage of Sun River water at Gibson Dam, the Willow Creek Reservoir on Willow Creek, Pishkun Reservoir north of the Sun River, Muddy Creek Reservoir on Muddy Creek near Power and Benton Lake Reservoir eight miles north of Great Falls. The lands to be irrigated, in addition to the present Greenfields District, were east of the District along the Sun River and the Teton River area to the north. Later opposition developed from the homesteaders on dry-land farms and all of the plan, except the Greenfields District, was given up. The withdrawn lands were restored to public entry. With the reduction in acreage, the use of Muddy Creek Reservoir and Benton Lake Reservoir was abandoned.

The entire enterprise was under the Reclamation Act. Investigations of reservoir sites and preliminary lines for the canal system were started in 1904. Surveys were continued in 1905 and carried on as long as funds permitted. By 1910 the surveys for the north side main canal were completed, and land classification, topographic surveys, and farm unit subdivisions were made so that the Greenfields District were ready for construction. Early in 1913 plans and specifications were drawn up for the Pishkun Supply Canal and the Sun River Slope Canal. In 1915 work was begun on the distribution system at Fairfield and extentions and additions finally brought the construction of the lateral system to a close in 1936. To operate and maintain the system, the Greenfields Irrigation District was formed under State Law in 1926.

Fortunately for the District, funds were made avialable from the construction money for the building of the drainage system and this work was carried forward under the Bureau of Reclamation supervision until July 1, 1958, the close of the construction period. The total amount expended for the construction of the Greenfields Irrigation District was $9,700,000.

PRESENT STATISTICS

Location: Since the Greenfields Irrigation District lies in both Cascade and Teton counties, this outline deals only with that portion of the Greenfields District lying in Cascade County. This area of the Greenfields Division has equal joint use of the reservoir system and the main supply canals used for diversion and distribution. Statistics regarding the location and capacities of these will be given fully in the survey made in Teton County. The land area of the Greenfields Division under irrigation in Cascade County is located in sections 5, 6, and 7, T. 20 N., R. 2 W.; sections 1-8, 12-15, 23-27, and 33-35 inclusive, T. 21 N., R. 2 W.; sections 1-14, 17-20, and 28-30 inclusive, T. 21 N., R. 1 W; sections 5-8 inclusive, T. 21 N., R. 1 E.; and section 32, T. 22 N., R. 1 E.

Length and Capacity of the Canals: The Cascade County area is supplied by the Greenfields South Canal which crosses the county line in section 7, T. 21 N., R. 2 W. It has a capacity at that point of 520 cfs. There are 23 miles of main canal and the distribution system totals 88 miles of laterals.

Operation and Maintenance: The water charges for the Greenfields Irrigation District in 1960 was $1.85 per acre for operation and maintenance, which entitled the farmers to 2 acre-feet of water per acre. Additional water can be secured as needed by the payment of $1.50 per acre. The irrigation system is in good operating condition and satisfactory water delivery has been made each year. District headquarters are located at Fairfield, Montana.

Present Users: The approximate number of water users under the Greenfields Irrigation District in 1960, totaled 135.

Acreage Irrigated: In 1960, there were 15,860 acres irrigated under this district in Cascade County.

WATER RIGHT DATA

The water rights that apply to the Sun River Project are filed in the counties of Cascade, Lewis and Clark, and Teton. They include decreed rights by adjudication and many appropriative water right filings.

The Following Are Decreed Water Right Filings

From the Sun River: Decreed to Florence C. Blossom, dated 6-1-80 for 92 miner's inches; decreed to Frank W. Bull, dated 1880 for 84 miner's inches; decreed to the Hepler Ditch Company, dated 7-9-91 for 160 miner's inches; decreed to William Ish, dated 1880 for 16 miner's inches; decreed to the United States of America (Indian land), dated 1870 for 498 miner's inches and dated 1888 for 362 miner's inches.

From Willow Creek: Decreed to the United States of America, dated 7-1-83 for 84 miner's inches. (Ref. for the above decreed water rights from the Sun River and Willow Creek may be found in the Sun River decree, dated June 13, 1911, Case No. 4742, Judgment Book 6, Pages 1 - 232, in the County Clerk of the Court's Office, Great Falls).

The Following Are Appropriative Water Right Filings

From Sun River: An appropriation by the United States of America (by J. B. Bond), dated 6-21-11 for 20,000 miner's inches (Ref. Book 61-D, Water Right Records, Page 558); an appropriation by the United States of America (by J. B. Bond), dated 7-21-11 for 20,000 miner's inches (Ref. Book 61-D, Water Right Records, Page 556); an appropriation by the United States of America, dated 11-25-19 for 20,000 miner's inches (Ref. Book 104-D, Water Right Records, Page 214); an appropriation by the United States of America, dated 11-25-19 for 20,000 miner's inches (Ref. Book 104-D, Water Right Records, Page 216); an appropriation by the United States of America, dated 11-21-22 for 20,000 miner's inches (Ref. Book 113-D, Water Right Records, Page 352); and an appropriation by the United States of America, dated 11-21-22 for 20,000 miner's inches (Ref. Book 113-D, Water Right Records, Page 354). All of the above appropriations from the Sun River may be found in the County Clerk and Recorder's Office, Great Falls, Montana.

An appropriation by the United States of America (by George O. Sanford), from Francis Creek, dated 9-23-19 for 1,000 miner's inches (Ref. Book 5-0, Misc. Records, Page 383); an appropriation by the United States of America (by George O. Sanford), from Green Timber Gulch, dated 9-23-19 for 2,000 miner's inches (Ref. Book 5-Q, Misc. Records, Page 386); an appropriation by the United States of America (by George O. Sanford), from Pishkun Reservoir, dated 3-8-22 for 60,000 miner's inches (Ref. Book 5-P, Misc. Records, Page 269); an appropriation by the United States of America (by George O. Sanford), from Pishkun Reservoir,

dated 3-8-22 for 60,000 miner's inches (Ref. Book 5-P, Misc. Records, Page 271); an appropriation by the United States of America (by George O. Sanford), from Pishkun Reservoir, dated 11-4-25 for 60,000 miner's inches (Ref. Book 5-Q Misc. Records, Page 88); an appropriation by the United States of America (by George O. Sanford), from Richardson Creek, dated 9-23-19 for 1,000 miner's inches (Ref. Book 5-0, Misc. Records, Page 384); an appropriation by the United States of America from the North Fork of the Sun River, dated 5-25-05 for 140,000 miner's inches (Ref. Book 5-A, Misc. Records, Page 190); an appropriation by the United States of America from North Fork Sun River, dated 11-6-17 for 1,200,000 miner's inches (Ref. Book 5-A, Misc. Records, Page 411); an appropriation by the United States of America from the North Fork Sun River, dated 6-30-11 for 140,000 miner's inches (Ref. Book 5-A, Misc. Records, Page 462). The above appropriations may be found in the County Clerk and Recorder's Office, Choteau, Montana.

An appropriation by the United States cf America (by J. B. Bond), from the North Fork of Sun River, dated 8-1-11 for 400,000 miner's inches (Ref. Book L, Water Right Records, Page 623); an appropriation by the United States of America (by J. B. Bond), from the South Fork of the North Fork of Sun River, dated 8-1-11 for 100,000 miner's inches (Ref. Book L, Water Right Records, Page 621); an appropriation by the United States of America (by J. B. Bond), from Sun River, dated 7-2-11 for 20,000 miner's inches (Ref. Book L, Water Right Records, Page 608); an appropriation by the United States of America (by J. B. Bond), from the North Fork of Sun River, dated 6-30-11 for 80,000 miner's inches (Ref. Book L, Water Right Records, Page 612); an appropriation by the United States of America (by J. B. Bond), from Willow Creek, dated 6-30-11 for 60,000 miner's inches (Ref. Book L, Water Right Records, Page 610); an appropriation by the United States of America (by S. B. Robbins), from the North Fork of Sun River, dated 5-25-05 for 80,000 miner's inches (Ref. Book M, Water Right Records, Page 10); an appropriation by the United States of America (by S. B. Robbins), from Willow Creek, dated 4-10-06 for 8,000 miner's inches (Ref. Book M, Water Right Records, Page 42). All of the above water right filings may be found in the County Clerk and Recorder's Office, Helena, Montana.

(See Maps in Part II, Pages 23, 25, 27, 28, and 29).

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
MISSOURI RIVER BASIN							
*Missouri River	21	4,483,260	112,081.50				
Curley Creek	1	160	4.00				
Madison River	1	9,600,000	240,000.00				
Stickney Creek	1	100	2.50				
North Fork Stickney Creek	2	600	15.00				
Dearborn River	2	80,000	2,000.00				
Flat Creek	1	8,000	200.00				
Willow Creek	1	100	2.50				
Unnamed Spring	1	25	.63				
Bird Tail Divide & Spring	2	80	2.00				
Unnamed Coulee	1	100	2.50				
Frost Creek	1	300	7.50				
Sullivan Creek	5	2,275	56.88				
Little Trout Creek	2	1,400	35.00				
Heibert Creek	2	620	15.50				
Unnamed Spring	1	100	2.50				
Unnamed Spring	1	100	2.50				
Total Dearborn River and Tributaries	**20**	**93,100**	**2,327.50**				
Unnamed Spring	1	4	.10				
Andy (Albright) (Rooney's) Creek	3	4,350	108.75				
Cox Creek	1	200	5.00				
Davis Spring	1	50	1.25				
Pruett (Trout) Creek	3	1,580	39.50				
Sheep Creek	3	1,000	25.00				
Big Coulee Creek	1	50	1.25				
Pole Creek	4	300	7.50				
Spring Creek	2	25	.63				
Hardy (Schofield) Creek	2	1,000	25.00				
Unnamed Spring	1	60	1.50				
Northeast Fork Hardy (Schofield) Creek	1	100	2.50				
Unnamed Spring	1	20	.50				
Sled Creek	2	200	5.00				
Finnegan Creek	4	570	14.25				
Unnamed Springs	1	25	.63				
Unnamed Coulee	1	100	2.50				
Jemison (Rumney) Slough	1	80	2.00				
Unnamed Spring	2	200	5.00				
Carter Creek	1	40	1.00				
Antelope Creek	10	3,825	95.63				
Unnamed Lake	1	150	3.75				
Harris Creek	2	425	10.63				
Boston (Allin) Creek	3	250	6.25				
Knapp Creek	3	2,175	54.38				
Unnamed Creek	1	60	1.50				
Negro Creek	1	50	1.25				

* Names of streams indented on the left-hand margin indicate that they are tributaries of the first stream named above which is not indented.

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Bunnell Creek	1	All	All				
Meadow Creek	3	250	6.25				
Unnamed Spring	2	150	3.75				
Stevenson Coulee	1	50	1.25				
Spring Creek	1	100	2.50				
Unnamed Spring	1	All	All				
Bird Creek	5	2,420	60.50				
McCullum Creek	1	100	2.50				
Branch Bird Creek	1	150	3.75				
Boston Creek	1	50	1.25				
Tributary to Bird Creek	1	100	2.50				
Geyser Creek	1	100	2.50				
Willow Creek	5	2,300	57.50				
Flannigan Creek	1	150	3.75				
Cherry Coulee	2	150	3.75				
Unnamed Coulee	2	200	5.00				
Unnamed Coulee	1	200	5.00				
Little Muddy Creek	26	36,460	911.50				
Muddy Creek	8	1,400	35.00				
Unnamed Spring	1	All	All				
Crown Butte Creek	4	80,500	2,012.50				
Unnamed Springs & Coulee	14	1,620	40.50				
Fort Shaw Butte Spring	1	50	1.25				
Unnamed Coulee	3	450	11.25				
Bird Tail Creek	6	1,900	47.50				
Unnamed Spring	8	395	9.88				
Webb Creek	2	200	5.00				
Frenchman Coulee	1	100	2.50				
Unnamed Coulee	3	1,150	28.75				
Canyon Basin	2	500	12.50				
Unnamed Spring	3	140	3.50				
Farrells Creek	1	100	2.50				
John Coulee	1	50	1.25				
Spring Creek	1	100	2.50				
Unnamed Spring	1	All	All				
St. Johns (Mission) Creek	13	3,420	85.50				
Amadeus Spring	1	200	5.00				
Unnamed Stream	1	100	2.50				
Bridge Creek	1	500	12.50				
Spring Creek	3	340	8.50				
Unnamed Coulee	2	150	3.75				
Table Butte Coulee	3	340	8.50				
Cherry Springs	8	640	16.00				
Unnamed Coulee	2	200	5.00				
Square Butte Coulee	1	100	2.50				
Dry (Anderson) Creek	3	6,450	161.25				
Unnamed Spring	1	0	0				
Unnamed Springs	4	400	10.00				
Hunter Creek	2	300	7.50				
Unnamed Lake	1	All	All				
Unnamed Spring	1	100	2.50				
Crooked Creek	1	150	3.75				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Spring Coulee	8	1,160	29.00				
Hall Creek	3	300	7.50				
Rocky Lake	1	500	12.50				
Rocky Gap Creek	9	6,245	156.13				
Spaulding Creek	2	200	5.00				
Unnamed Spring	1	100	2.50				
Raspberry Creek	1	200	5.00				
Rock Springs	7	450	11.25				
Scull Butte Creek	3	450	11.25				
Unnamed Spring	5	620	15.50				
Unnamed Coulee	5	700	17.50				
Lepley Creek	10	1,900	47.50				
Dry (Spring) Coulee	5	850	21.25				
Square Butte Lake	4	860	21.50				
Square Butte Spring	1	20	.50				
Well and Reservoir	1	144	3.60				
Total Little Muddy Creek and Tributaries	**200**	**153,204**	**3,830.10**				
Unnamed Coulee	12	1,340	33.50				
Unnamed Springs	2	303	7.58				
Unnamed Lakes	1	600	15.00				
Wells	2	5,500	137.50				
Castle (Castner) Coulee	5	1,000	25.00				
Unnamed Lake	1	1,000	25.00				
Hurst Coulee	1	100	2.50				
Dry (Flat) Creek	6	1,100	27.50				
Unnamed Stream	2	1,000	25.00				
Geyser Creek	3	275	6.88				
Unnamed Coulee	1	250	6.25				
Rock Coulee	2	300	7.50				
Unnamed Coulee	1	200	5.00				
Unnamed Coulee	2	150	3.75				
Anderson Coulee	2	350	8.75				
Spring Coulee	2	200	5.00				
Donnelly Coulee	1	100	2.50				
Drainage	1	100	2.50				
Swab Run (Ulm Coulee)	5	2,410	60.25				
Unnamed Coulee	10	1,650	41.25				
Smith River (Deep Creek)	12	6,810	170.25				
Bear Gulch	2	225	5.66				
Trout Creek	6	2,135	53.38				
Coal (North Fork Trout) (Little Trout) Creek	4	580	14.50				
Unnamed Coulee	1	75	1.88				
Spring Creek	1	40	1.00				
Unnamed Spring	4	220	5.50				
Unnamed Spring	2	39	.98				
Spring Creek	2	230	5.75				
Unnamed Spring	1	50	1.25				
Cottonwood Creek	1	75	1.88				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
South Fork Cottonwood Creek	1	20	.50				
Unnamed Spring	2	50	1.25				
Fir Creek	5	235	5.88				
Spring Coulee	1	800	20.00				
Unnamed Spring	2	200	5.00				
Unnamed Springs	3	270	6.75				
Dry Fork Smith River	1	100	2.50				
Blankenbaker Creek	1	100	2.50				
Brown Creek	0	0	0				
Flaherty Spring	2	100	2.50				
Unnamed Spring	1	100	2.50				
Unnamed Spring	1	200	5.00				
Black Butte Spring	1	44	1.10				
Elge Gulch	1	100	2.50				
Unnamed Coulee	3	250	6.25				
Unnamed Spring	2	200	5.00				
Givens Creek	1	100	2.50				
Unnamed Coulee	1	120	3.00				
Rock Coulee	4	500	12.50				
Marxer Spring Creek	2	20	.50				
Unnamed Springs	1	60	1.50				
Switzer Coulee	3	250	6.25				
Mullens (McMullen) Creek	3	1,140	28.50				
Clark Creek	2	400	10.00				
Clark Creek Springs	1	75	1.88				
Unnamed Spring	6	510	12.75				
Herman Gulch	1	20	.50				
Herman Gulch Spring	1	50	1.25				
East Branch Clark Creek	1	100	2.50				
Trout Lake	1	40	1.00				
Unnamed Coulee	1	300	7.50				
Unnamed Spring Coulee	1	100	2.50				
Hound Creek	8	9,900	247.50				
East Fork Hound Creek	2	200	5.00				
Meadow Creek	1	500	12.50				
Bear Creek	2	325	8.13				
Dog Creek	1	50	1.25				
Unnamed Spring	2	110	2.75				
Pole (Spring) Creek	9	1,770	44.25				
Unnamed Spring	1	100	2.50				
Middle (East Fork Hound) Creek	13	3,410	85.25				
Rocky Spring	1	100	2.50				
Northwest Fork of Middle (East Fork Hound) Creek	3	700	17.50				
Unnamed Springs	1	50	1.25				
Elk Creek	3	1,250	31.25				
Forks of Elk Creek	1	All	All				
Spring Branch	2	200	5.00				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Windy Hollow (East Fork Hound Creek)	8	2,900	72.50				
Camp (Encampment) Creek	1	160	4.00				
Middle Fork Camp (West Fork Camp) (Sawin) Creek	3	260	6.50				
Unnamed Spring	1	15	.38				
Fir Creek	1	200	5.00				
Crooked Creek	3	260	6.50				
Unnamed Springs	1	100	2.50				
Government Creek	5	200	5.00				
West Fork Hound Creek	2	1,150	28.75				
Squaw Creek	2	1,700	42.50				
Allen Creek	3	220	5.50				
Unnamed Springs	1	300	7.50				
Kennedy Creek	1	200	5.00				
Porcupine Creek	1	100	2.50				
Unnamed Spring	1	100	2.50				
Unnamed Coulee	1	200	5.00				
Middle Fork Porcupine Creek	1	25	.63				
Unnamed Spring	1	50	1.25				
Soldier Creek	6	700	17.50				
Unnamed Spring	1	All	All				
North Fork Soldier Creek	3	150	3.75				
McGrail Coulee	1	160	4.00				
Muddy Creek	1	200	5.00				
Unnamed Springs	1	100	2.50				
Unnamed Stream	0	0	0				
Unnamed Lake	2	240	6.00				
Unnamed Spring	1	100	2.50				
Spring Creek	6	1,900	47.50				
Unnamed Springs	1	200	5.00				
Willow Spring Creek	3	900	22.50				
Cottonwood Creek	1	100	2.50				
Unnamed Coulee	1	50	1.25				
Total Hound Creek and Tributaries	**109**	**31,605**	**790.13**				
Murphy Coulee	2	150	3.75				
Rock Coulee	2	220	5.50				
Unnamed Spring	2	210	5.25				
Unnamed Coulee	1	30	.75				
Boston Creek (Coulee)	10	945	23.63				
Dry Fork Creek	1	75	1.88				
McLeods Coulee	6	515	12.88				
McLeod Spring	9	415	10.38				
Unnamed Springs	7	1,015	25.38				
Webb Coulee	6	490	12.25				
Spanish Coulee	7	1,500	37.50				
Unnamed Coulee	3	500	12.50				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Coulee	1	60	1.50				
Ming Coulee	5	860	21.50				
Unnamed Spring	2	200	5.00				
Davis Coulee	2	100	2.50				
Unnamed Coulee	3	250	6.25				
Unnamed Springs	7	1,425	35.63				
Unnamed Coulee	9	1,075	26.88				
Spring Creek	2	200	5.00				
Unnamed Coulee	3	330	8.25				
Unnamed Spring	1	100	2.50				
Unnamed Springs	4	275	6.88				
Betts Reservoir	1	40	1.00				
North Slope Coulee	1	200	5.00				
Unnamed Coulee	3	140	3.50				
Unnamed Springs	7	505	12.63				
Unnamed Coulee	2	250	6.25				
Unnamed Lake	1	100	2.50				
Unnamed Reservoir	1	20	.50				
Unnamed Springs	8	322	8.05				
Goodwin Coulee	5	1,700	42.50				
Unnamed Coulee	4	260	6.50				
Southside Spring	1	10	.25				
Unnamed Coulee	1	100	2.50				
Unnamed Lake and Spring	1	1.5	.04				
Carr's Coulee	3	125	3.13				
Unnamed Spring	1	1.5	.04				
Ruman's Coulee	1	50	1.25				
Dry Wolf Creek	5	2,850	71.25				
Well	1	30	.75				
Howard Coulee	2	90	2.25				
Unnamed Spring	2	275	6.88				
Unnamed Coulee	2	100	2.50				
Total Smith River and Tributaries	**350**	**66,748**	**1,668.70**				
Crall Well	1	50	1.25				
Unnamed Springs	5	2,150	53.75				
Unnamed Coulee	1	150	3.75				
Coates and Campbell Coulee	3	1,800	45.00				
Unnamed Springs	3	700	17.50				
Unnamed Coulee	3	640	16.00				
Unnamed Springs	4	1,870	46.75				
Jones Coulee	1	300	7.50				
Unnamed Spring	1	500	12.50				
Nelson Coulee	1	100	2.50				
Unnamed Spring	1	10	.25				
Sand Coulee Creek	16	6,430	160.75				
Middle Fork Sand Coulee Creek	1	288	7.20				
Unnamed Coulee	3	300	7.50				
East Fork Sand Coulee Creek	3	1,070	26.75				
Unnamed Spring	1	300	7.50				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Fowler Creek	4	800	20.00				
Unnamed Coulee	3	480	12.00				
Unnamed Springs	2	124	3.10				
Joslin Creek	1	500	12.50				
Johnson's Coulee	1	160	4.00				
Unnamed Springs	1	100	2.50				
Unnamed Coulee	1	100	2.50				
Unnamed Springs	2	150	3.75				
Skunk Coulee	4	350	8.75				
Unnamed Springs	2	100	2.50				
Unnamed Spring	1	50	1.25				
Two Unnamed Lakes	1	250	6.25				
Unnamed Coulee	3	450	11.25				
Rock Gulch	2	320	8.00				
Unnamed Coulee	3	850	21.25				
Unnamed Spring	1	40	1.00				
Spring Creek	3	400	10.00				
Unnamed Spring	2	150	3.75				
Unnamed Coulee	4	430	10.75				
Coyote Coulee	2	All	All				
Unnamed Spring	1	100	2.50				
Cottonwood Coulee	13	969	24.23				
Unnamed Coulee	7	520	13.00				
East Fork Cottonwood Coulee	3	350	8.75				
Unnamed Spring	2	125	3.13				
East Fork of East Fork of Cottonwood Coulee	2	200	5.00				
Unnamed Springs	3	400	10.00				
Benson Spring	1	10	.25				
Unnamed Springs	3	20	.50				
McGiffins Coulee	7	890	22.25				
Unnamed Coulee	1	200	5.00				
Unnamed Springs	3	400	10.00				
Pope Reservoir	1	50	1.25				
Unnamed Spring	1	25	.63				
Unnamed Spring	1	4	.10				
Straight (Bywater) Coulee	3	500	12.50				
Unnamed Springs	2	200	5.00				
Sailor Jack Spring	1	100	2.50				
Mine Seep and Spring	1	40	1.00				
Carpenter Spring	1	All	All				
Coal Tunnel	1	200	5.00				
Antelope Coulee Creek	1	200	5.00				
Reservoir	1	40	1.00				
Unnamed Lake	1	100	2.50				
Goon's Coulee	1	300	7.50				
Unnamed Spring	1	100	2.50				
Walker Coulee	2	600	15.00				
Well	1	40	1.00				
Rocky Branch Coulee	1	400	10.00				
Spring Coulee	1	100	2.50				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
East Branch Spring Coulee	1	200	5.00				
Unnamed Springs	1	50	1.25				
West Branch Spring Coulee	3	500	12.50				
Unnamed Coulee	2	150	3.75				
Thomas Springs	1	30	.75				
Unnamed Spring	1	.5	.01				
Total Sand Coulee Creek and Tributaries	**144**	**22,305.5**	**557.64**				
Sun River	37	463,908	11,597.70	4742	15	29,455.20	736.38
North Fork Sun River	1	80,000	2,000.00	4742		(See Sun River)	
Willow Creek	1	60,000	1,500.00	4742		(See Sun River)	
South Fork Sun River	0	0	0	4742		(See Sun River)	
Smith Creek	1	30,000	750.00	4742		(See Sun River)	
Ford Creek	1	30,000	750.00	4742		(See Sun River)	
Unnamed Coulee	1	200	5.00				
Anderson Coulee	2	200	5.00				
Simms (West Fork Simms) Creek	14	6,215	155.38	4742	2	80.00	2.00
South Fork Simms (Spring) Creek	2	210	5.25	4742	2	864.00	21.60
Unnamed Coulee	2	200	5.00				
Branch of Simms Creek	2	200	5.00				
Unnamed Coulee	3	550	13.75				
Unnamed Springs	2	150	3.75				
Unnamed Coulee	2	350	8.75				
Spring Lake	1	100	2.50				
Big Coulee	0	0	0				
Blackfoot Coulee	4	640	16.00				
Unnamed Spring	9	1,081	27.03				
Ababe Creek	1	80	2.00				
Unnamed Spring	3	20	.50				
Mill Coulee	7	2,410	60.25				
Unnamed Coulee	2	300	7.50				
Huber Coulee	3	600	15.00				
Unnamed Spring	1	100	2.50				
Unnamed Spring	1	100	2.50				
Unnamed Coulee	4	350	8.75				
Four Mile Coulee	2	5,300	132.50				
Unnamed Coulee	7	940	23.50				
Pot Hole Creek	1	60	1.50				
Stephan Coulee	1	0	0				
Unnamed Springs	1	50	1.25				
Big Muddy Creek	17	156,082	3,902.05				
Gordon Coulee	3	440	11.00				
Largents Coulee	6	2,710	67.75				
Unnamed Spring	2	80	2.00				
Briggs Coulee (or Creek)	2	1,600	40.00				
Unnamed Coulee	4	2,400	60.00				
Unnamed Spring	9	1,440	36.00				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Antelope (Badger, Rabbit, Chokecherry) Coulee	9	1,420	35.50				
Flat Coulee	2	100	2.50				
Unnamed Coulee	1	100	2.50				
Horseshoe Slough	1	100	2.50				
Platt Coulee	1	160	4.00				
Gray Coulee	1	100	2.50				
McIvers Creek	1	200	5.00				
Spring Coulee	3	101,000	2,525.00				
Total Sun River and Tributaries	**181**	**952,246**	**23,806.16**		**19**	**30,399.20**	**759.98**
Subterranean Stream	1	40,000	1,000.00				
Dry Coulee	1	850	21.25				
Box Elder Creek	16	5,030	125.75				
Unnamed Springs	2	150	3.75				
Perrault Spring	2	60	1.50				
Unnamed Pond	2	80	2.00				
Unnamed Coulee	1	20	.50				
Unnamed Spring	2	70	1.75				
Johnson Creek	2	250	6.25				
Unnamed Spring	2	200	5.00				
Unnamed Lake	2	200	5.00				
Reservoir	2	90	2.25				
Shupe Coulee	1	100	2.50				
Unnamed Springs	2	80	2.00				
Dry Coulee	4	1,700	42.50				
Unnamed Spring	1	50	1.25				
Black Rock Creek	5	680	17.00				
Unnamed Coulee	4	500	12.50				
Beaudry Gulch	1	40	1.00				
Unnamed Coulee	5	620	15.50				
Dry Coulee	2	150	3.75				
Unnamed Spring	1	50	1.25				
Dickie Coulee	7	724	18.10				
Unnamed Spring	2	300	7.50				
Unnamed Coulee	1	100	2.50				
Belleview Creek	5	800	20.00				
Peterson (Spring) Coulee	4	480	12.00				
Clear Creek	1	400	10.00				
Dry Coulee	1	150	3.75				
Flat Coulee	2	150	3.75				
Unnamed Coulee	1	200	5.00				
Total Box Elder Creek and Tributaries	**83**	**13,424**	**335.60**				
Unnamed Coulee	1	225	5.63				
Belt Creek	72	443,510	11,087.75				
†Compromise Ravine	1	25	.63				
†Dutro Creek	4	1,225	30.63				
†Gold Run Creek	5	2,300	57.50				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
†Narrow Gage Creek	2	160	4.00				
†Plaude Creek	1	250	6.25				
†Royal Creek	1	1,000	25.00				
†Unnamed Stream	1	200	5.00				
Sawmill Creek	1	8,000	200.00				
Eagle Creek	2	350	8.75				
O'Brien Creek	4	2,150	53.75				
Spring Creek	1	200	5.00				
Unnamed Spring	1	500	12.50				
McNeil Creek	1	50	1.25				
Soule Creek	1	25	.63				
Mineral Riogo Gulch Stream	1	0	0				
Johnston (Johnson) Creek	4	750	18.75				
Rock Creek	8	2,520	63.00				
Carpenter Creek	15	20,590	514.75				
Snow Creek	13	10,160	254.00				
Harley Creek	4	2,600	65.00				
Graveyard Gulch Creek	1	120	3.00				
West Fork Harley Creek	1	400	10.00				
Spring Creek	7	650	16.25				
Unnamed Spring	1	100	2.50				
Leroy Coulee	1	5	.13				
Slaughter House Creek	1	120	3.00				
Hoover Creek	2	8,000	200.00				
Unnamed Stream	3	500	12.50				
Unnamed Springs	8	760	19.00				
Paine (Eaton) Coulee	1	40	1.00				
Spring Coulee	3	1,100	27.50				
Monarch Spring	1	50	1.25				
Dry Fork Belt Creek	9	5,940	148.50				
†Dream Gulch	1	100	2.50				
†Lilly Creek	1	200	5.00				
†Spruce Gulch	2	275	6.88				
Galena (Spring) Creek	2	2	.05				
West Fork Galena Creek	1	All	All				
Park Creek	1	30	.75				
Unnamed Spring	1	4	.10				
Silver Creek	1	5	.13				
Smoke in the Hole Creek	1	80	2.00				
Unnamed Spring	4	110	2.75				
Tillinghast Creek	6	13,160	329.00				
Unnamed Spring	1	10	.25				
Spring Creek	2	850	21.25				
Big Timber Creek	3	220	5.50				
Unnamed Spring	2	190	4.75				
Iron Creek	1	500	12.50				
Pilgrim Creek	7	18,732	468.30				
Deer Creek	4	3,500	87.50				
Tyler Creek	2	600	15.00				
Minnie Ha Ha Creek	1	500	12.50				
Logging Creek	5	2,400	60.00				
Unnamed Spring	1	30	.75				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Stream	1	50	1.25				
Unnamed Spring	1	30	.75				
Tiger Butte Creek	4	1,000	25.00				
Lime Kiln Creek	2	130	3.25				
Unnamed Coulee	3	680	17.00				
Nasen and Schmidt Coulee	5	430	10.75				
Unnamed Coulee	4	450	11.25				
Reservoir Creek	7	4,120	103.00				
Benton Lake	1	100	2.50				
Unnamed Springs	7	470	11.75				
Unnamed Coulee	1	100	2.50				
Unnamed Springs	1	500	12.50				
Gwynn Coulee	2	300	7.50				
Unnamed Creek	2	300	7.50				
Unnamed Springs	6	1,230	30.75				
Unnamed Coulee	2	175	4.38				
Goodman Coulee	9	1,210	30.25				
Unnamed Spring	4	410	10.25				
Unnamed Coulee	2	150	3.75				
Anderson Spring Coulee	2	300	7.50				
Unnamed Coulee	8	980	24.50				
Unnamed Springs	2	250	6.25				
Well	1	100	2.50				
Guinn Coulee	1	250	6.25				
Unnamed Spring	1	100	2.50				
Otter Creek	5	880	22.00				
Bundys Creek	2	300	7.50				
Unnamed Coulee	2	360	9.00				
Never Sweat Coulee	1	150	3.75				
Unnamed Springs	8	890	22.25				
Swan (Anderson) Coulee	6	600	15.00				
Unnamed Springs	4	400	10.00				
Unnamed Coulee	3	520	13.00				
Brigman (Spring) Coulee	5	345	8.63				
Unnamed Coulee	2	200	5.00				
Unnamed Springs	10	1,636	40.90				
Reservoir Creek	5	480	12.00				
Reservoir Spring	1	200	5.00				
Stark Coulee	2	230	5.75				
Unnamed Spring	2	200	5.00				
Ford (Anderson) Coulee	8	700	17.50				
Unnamed Spring	2	120	3.00				
Ford Coulee Spring	1	50	1.25				
Unnamed Spring	1	120	3.00				
Rocky Ridge Spring	1	100	2.50				
Unnamed Spring	1	100	2.50				
Marion Coulee	4	700	17.50				
Unnamed Spring	3	20	.50				
Unnamed Coulee	8	1,000	25.00				
Cora Creek	6	1,225	30.63				
North Fork Cora Creek	4	540	13.50				
Spring Coulee	2	90	2.25				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Nuttingham Coulee	2	200	5.00				
Spring Lake	1	100	2.50				
Anderson Coulee	1	All	All				
Unnamed Coulee	3	280	7.00				
Total Otter Creek and Tributaries	**106**	**12,736**	**318.41**				
Unnamed Coulee	3	300	7.50				
Neil (Neal) Creek	12	2,140	53.50				
Unnamed Coulee	3	320	8.00				
Unnamed Spring	3	100	2.50				
Neadle Creek	1	200	5.00				
Unnamed Coulee	2	300	7.50				
Spring Coulee	2	300	7.50				
Unnamed Coulee	8	555	13.88				
Unnamed Spring	1	50	1.25				
Half Breed Coulee	1	100	2.50				
Unnamed Spring	1	144	3.60				
Unnamed Coulee	1	50	1.25				
Little Belt Creek	14	5,220	130.50				
Branch Little Belt Creek	1	100	2.50				
Teppo Creek	1	100	2.50				
South Fork Little Belt Creek	3	400	10.00				
Sawmill Creek	4	1,300	32.50				
Unnamed Spring	1	40	1.00				
North Branch Sawmill Creek	1	100	2.50				
Sheep Creek	3	300	7.50				
Unnamed Spring	1	100	2.50				
Unnamed Coulee	3	140	3.50				
Unnamed Spring	1	40	1.00				
Unnamed Coulee	3	300	7.50				
Vissigat Coulee	2	1,000	25.00				
Belt Butte Coulee	3	310	7.75				
Unnamed Spring	1	100	2.50				
Unnamed Coulee	9	760	19.00				
Dry Coulee	1	288	7.20				
Reservoir and Spring	3	380	9.50				
Deadman's Coulee	0	0	0				
Unnamed Stream	3	780	19.50				
Big Willow Creek	4	700	17.50				
Willow Creek	5	825	20.63				
Unnamed Coulee	1	40	1.00				
Middle (Willow) Creek	1	100	2.50				
Unnamed Spring	3	205	5.13				
Unnamed Coulee	1	100	2.50				
Spring Coulee	1	200	5.00				
Unnamed Coulee	1	150	3.75				
Dry Coulee	1	100	2.50				
Buckbrush Coulee	1	150	3.75				
Spring Coulee	3	340	8.50				

WATER RIGHT DATA—CASCADE COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Dog Coulee	2	140	3.50				
Unnamed Coulee	2	250	6.25				
Rattlesnake Coulee	3	310	7.75				
North Willow Creek	4	1,190	29.75				
Unnamed Spring	1	100	2.50				
Unnamed Coulee	2	220	5.50				
O'Reilly Spring	1	30	.75				
Parkers Springs	1	50	1.25				
Dry Coulee	2	260	6.50				
State Coulee	2	160	4.00				
Unnamed Coulee	1	100	2.50				
Red Coulee	6	1,190	29.75				
West Branch Red Coulee	2	200	5.00				
Unnamed Spring	1	100	2.50				
Unnamed Stream	3	1,080	27.00				
Unnamed Lake	1	200	5.00				
Unnamed Coulee	1	100	2.50				
Total Belt Creek and Tributaries	**572**	**607,306**	**15,182.71**				
Black Feet Gulch	2	5,000	125.00				
Benton Lake Cut	1	100	2.50				
Benton Lake	5	52,152	1,303.80				
Bacon Coulee	1	100	2.50				
Unnamed Coulee	8	1,600	40.00				
Dry Coulee	2	200	5.00				
Stony Coulee	1	200	5.00				
Klines Coulee	4	600	15.00				
Crooked Coulee	2	300	7.50				
Big Cut Spring	2	75	1.88				
Flat Coulee	4	520	13.00				
Dry Horse Coulee	1	100	2.50				
Unnamed Spring	1	40	1.00				
Bailey Lake or Basin	1	20,000	500.00				
Unnamed Coulee	4	1,244	31.10				
Unnamed Spring	2	20	.50				
Horn Coulee	4	2,900	72.50				
Rawhide Coulee	1	2,000	50.00				
Deep Coulee	2	1,000	25.00				
Portage Coulee	8	4,340	108.50				
Unnamed Coulee	1	600	15.00				
Heindahl Coulee	1	350	8.75				
Long Coulee	1	100	2.50				
Ryan Coulee	3	50,000	1,250.00				
South Fork Ryan Coulee	3	1,050	26.25				
Unnamed Waters	1	All	All				
Grand Total Cascade County	**1,824**	**16,227,677**	**405,691.92**		**19**	**30,399.20**	**759.98**

† These streams are not located except as being tributaries to the major stream.

DRAINAGES IN CASCADE COUNTY NOT LOCATED

STREAM	No. of Filings	Miner's Inches	Cu. Ft. Per Sec.
Basin Creek	1	200	5.00
Crawford Creek	1	40	1.00
Drain Creek	1	60	1.50
Fish Lake	1	200	5.00
North and South Forks Rock Creek	1	1,200	30.00
San Miguel Creek	1	60	1.50
Sixteen Color Gulch	1	300	7.50
Slide Rock Creek	1	40	1.00
Spring Coulee	1	100	2.50
Spring Creek	1	80	2.00
Bennetts Spring	1	200	5.00
C. C. C. Camp Spring	1	20	.50
Holter Spur Spring	1	50	1.25
Park Springs	1	25	.62
Robertson Spring	1	20	.50
Unnamed Springs	6	1,054	26.35
Spring in Martin Coulee	1	3.2	.08
Unnamed Stream	4	32	.80
Total	**26**	**3,684.2**	**92.10**

WATER RESOURCES SURVEY

CASCADE COUNTY, MONTANA

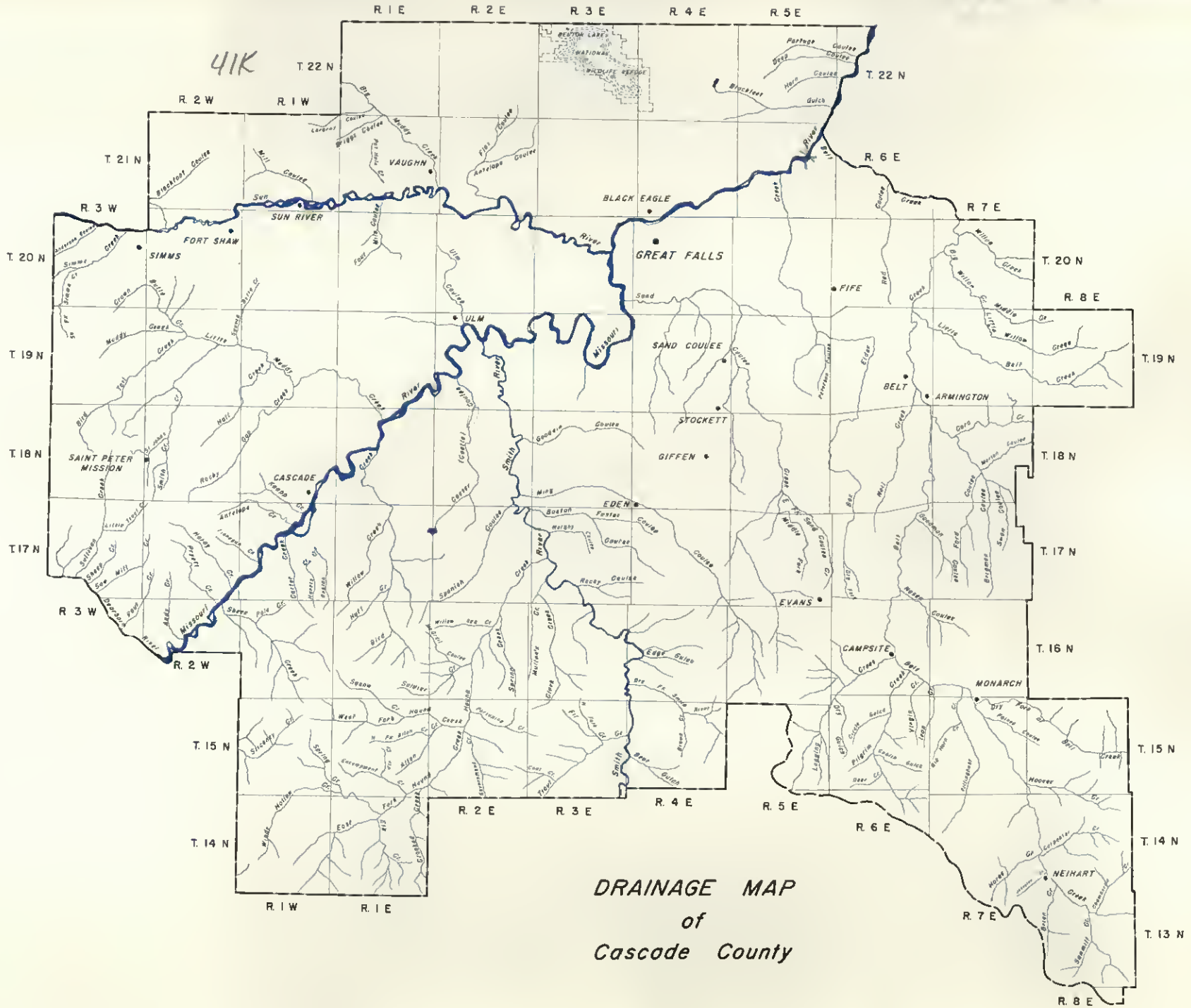
Part II

Maps Showing Irrigated Areas

Published by
STATE ENGINEER'S OFFICE
Helena, Montana
June, 1961

MAP INDEX

ALL MAPS HAVE BEEN MADE FROM AERIAL PHOTOGRAPHS


41K
R 1 E
R 2 E
R 3 E
R 4 E
R 5 E
T. 22 N
R. 2 W
R. 1 W
R. 6 E
T. 21 N
R. 3 W
R. 7 E
T. 20 N
R. 8 E
T. 19 N
T. 18 N
T. 17 N
T. 16 N
T. 15 N
T. 14 N
T. 13 N
VAUGHN
SUN RIVER
FORT SHAW
SIMMS
BLACK EAGLE
GREAT FALLS
FIFE
ULM
SAND COULEE
BELT
ARMINGTON
STOCKETT
GIFFEN
EDEN
SAINT PETER MISSION
CASCADE
EVANS
CAMPSITE
MONARCH
NEIHART
Missouri River
Sun River
Smith River
Belt Creek
Little Belt Creek
Willow Creek
Spring Creek
Muddy Creek
Deep Gulch
Edge Gulch
DRAINAGE MAP
of
Cascade County

MAP SYMBOL INDEX

BOUNDARIES

- COUNTY LINE
- NATIONAL FOREST LINE

DITCHES

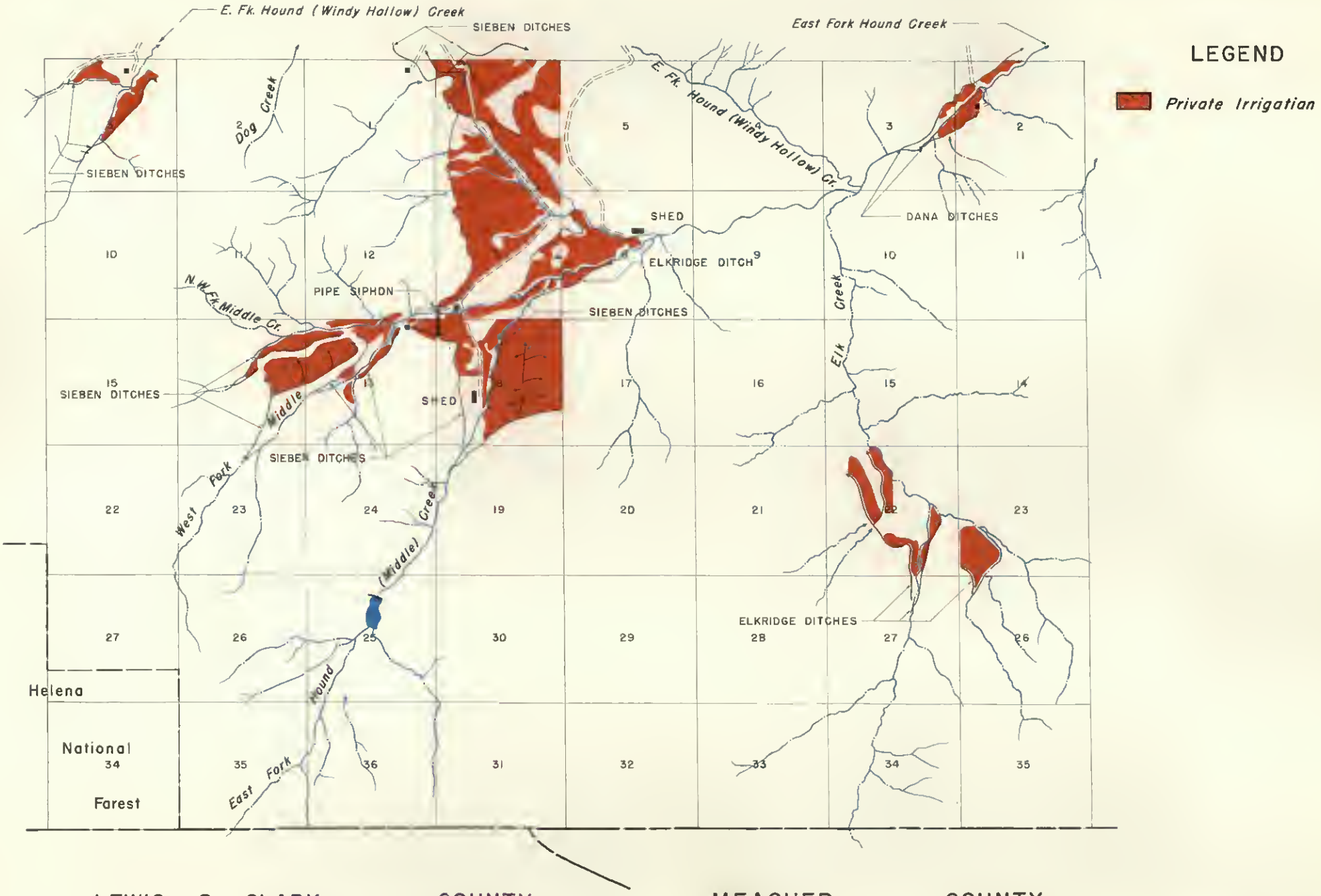
- CANALS OR DITCHES
- DRAIN DITCHES
- PROPOSED DITCHES

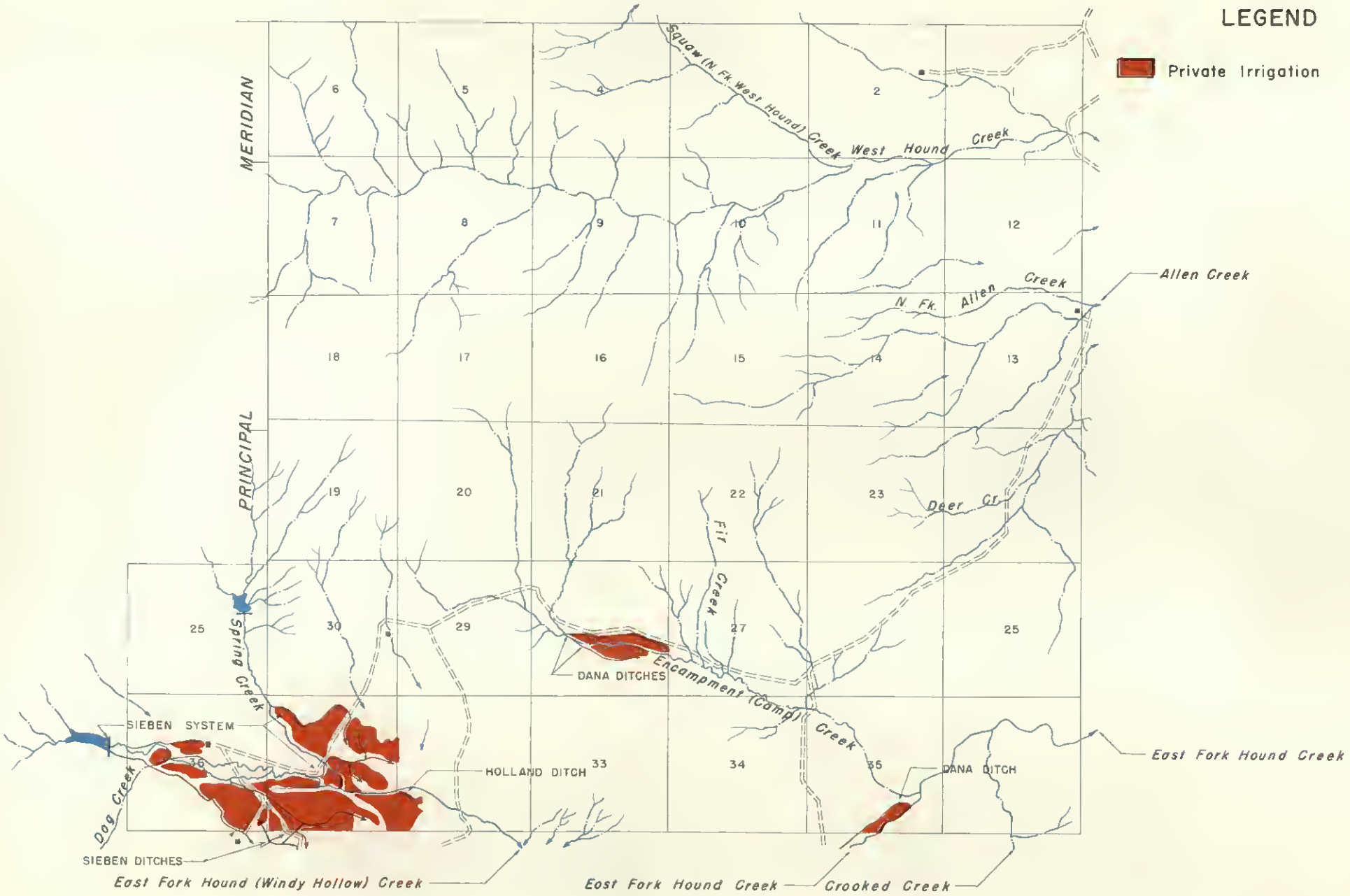
TRANSPORTATION

- PAVED ROADS
- UNPAVED ROADS
- RAILROADS
- STATE HIGHWAY
- U.S. HIGHWAY
- AIRPORT

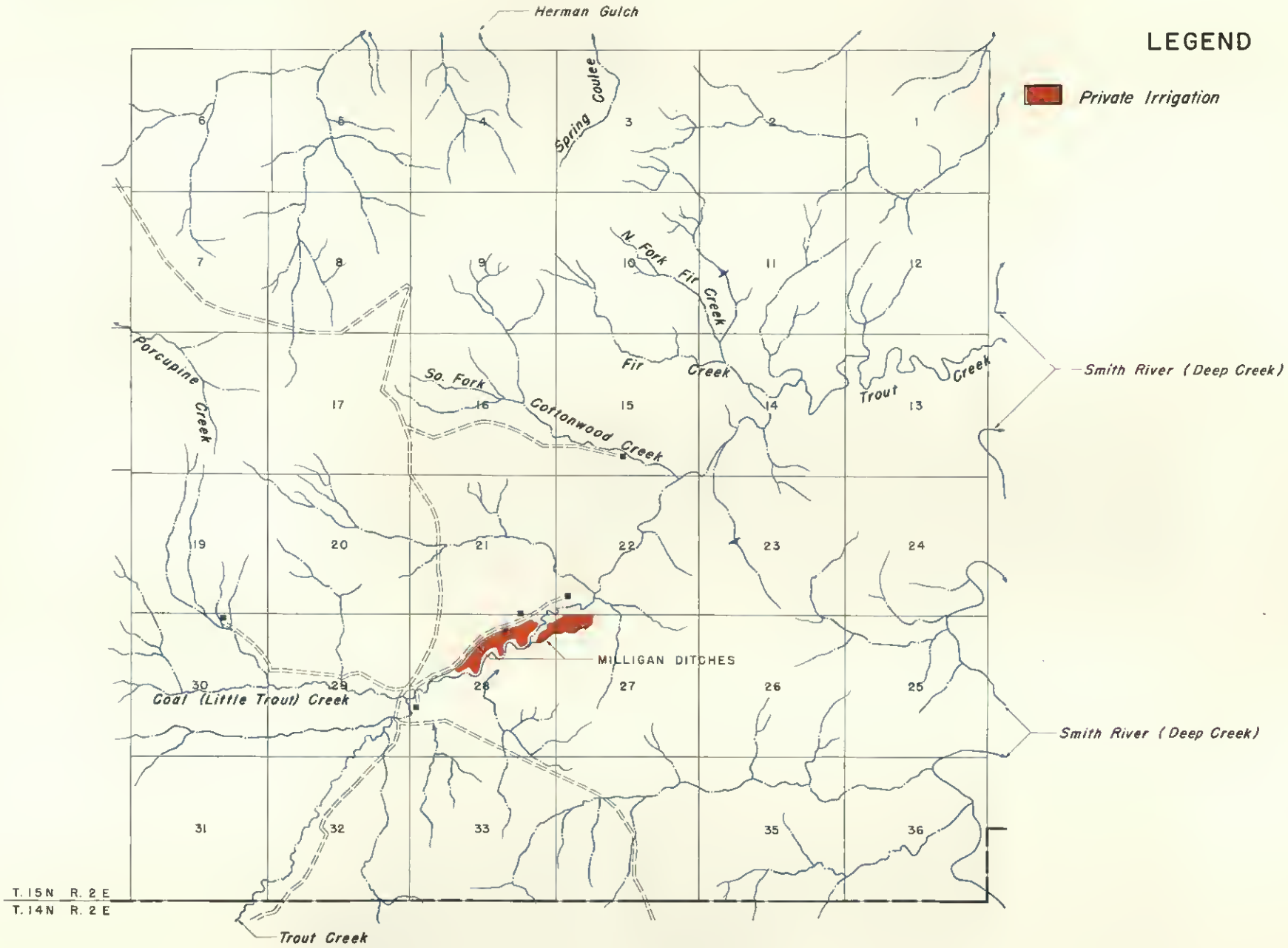
STRUCTURES & UNITS

- DAM
- DIKE
- FLUME
- SIPHON
- SPILL
- SPRINKLER SYSTEM
- WEIR
- PIPE LINE
- PUMP
- PUMP SITE
- RESERVOIR
- WELL
- NATURAL CARRIER USED AS DITCH
- SPRING
- SWAMP
- GAUGING STATION
- POWER PLANT
- STORAGE TANK
- CEMETERY
- FAIRGROUND
- FARM OR RANCH UNIT
- LOOKOUT STATION
- RANGER STATION
- RAILROAD TUNNEL
- SCHOOL
- SHAFT, MINE, OR DRIFT

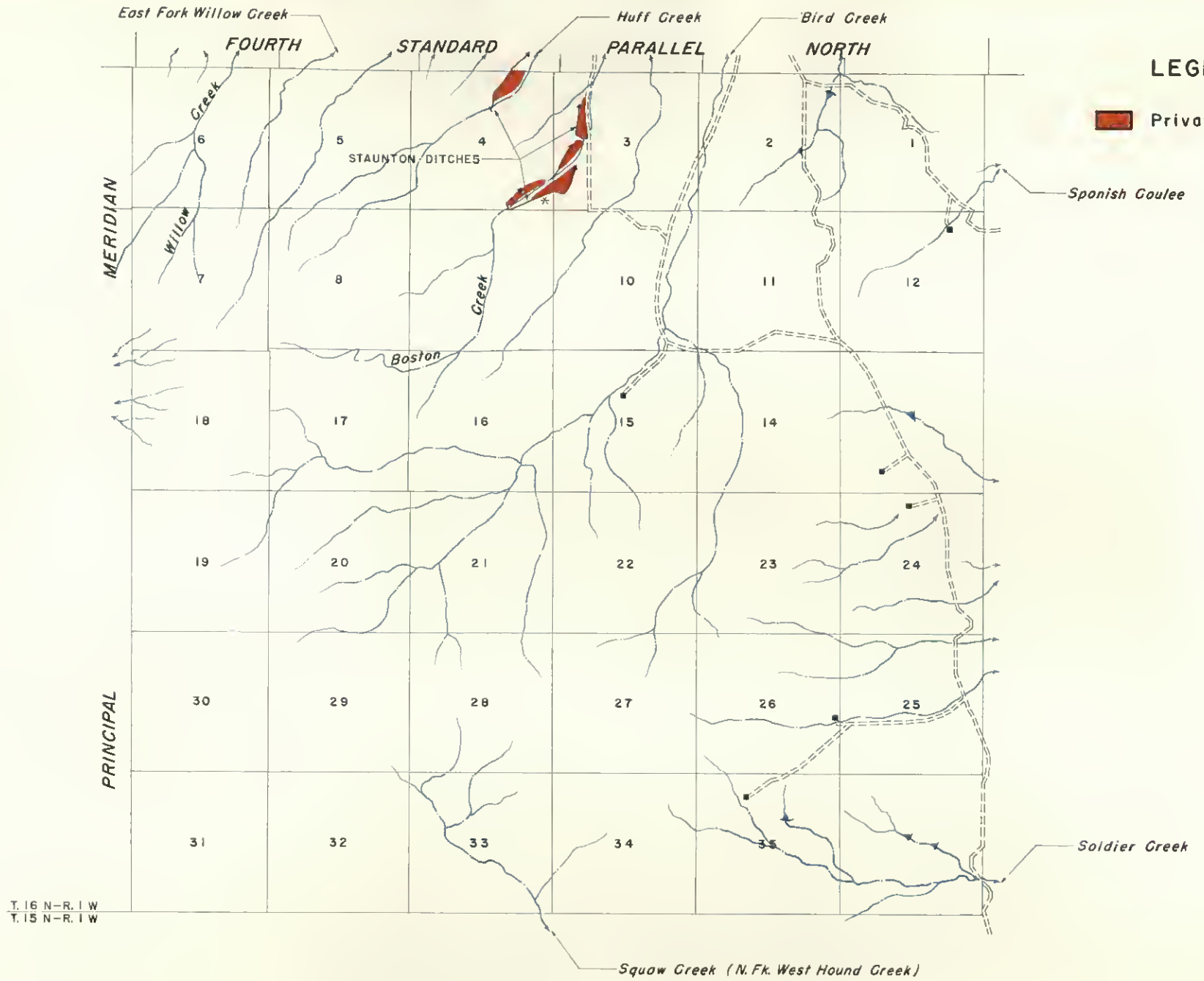

E. Fk. Hound (Windy Hollow) Creek
SIEBEN DITCHES
East Fork Hound Creek
LEGEND
Private Irrigation
SIEBEN DITCHES
Dog Creek
E. Fk. Hound (Windy Hollow) Cr.
DANA DITCHES
SHED
ELKRIDGE DITCH
PIPE SIPHON
N.W.Fk. Middle Cr.
SIEBEN DITCHES
Elk Creek
SIEBEN DITCHES
SHED
Middle Fork West
SIEBEN DITCHES
(Middle) Creek
ELKRIDGE DITCHES
Helena National Forest
Hound
East Fork
LEWIS & CLARK COUNTY
MEAGHER COUNTY
T. 14 N.—R. 1 E & W


LEGEND
Private Irrigation
MERIDIAN
PRINCIPAL
Squaw (N. Fk. West Hound) Creek
West Hound Creek
Allen Creek
N. Fk. Allen Creek
Deer Cr.
Fir Creek
Spring Creek
Dog Creek
SIEBEN SYSTEM
SIEBEN DITCHES
HOLLAND DITCH
DANA DITCHES
DANA DITCH
Encampment (Camp) Creek
East Fork Hound (Windy Hollow) Creek
East Fork Hound Creek
Crooked Creek
East Fork Hound Creek
6
5
4
2
1
7
8
9
10
11
12
18
17
16
15
14
13
19
20
21
22
23
25
30
29
27
25
36
33
34
35

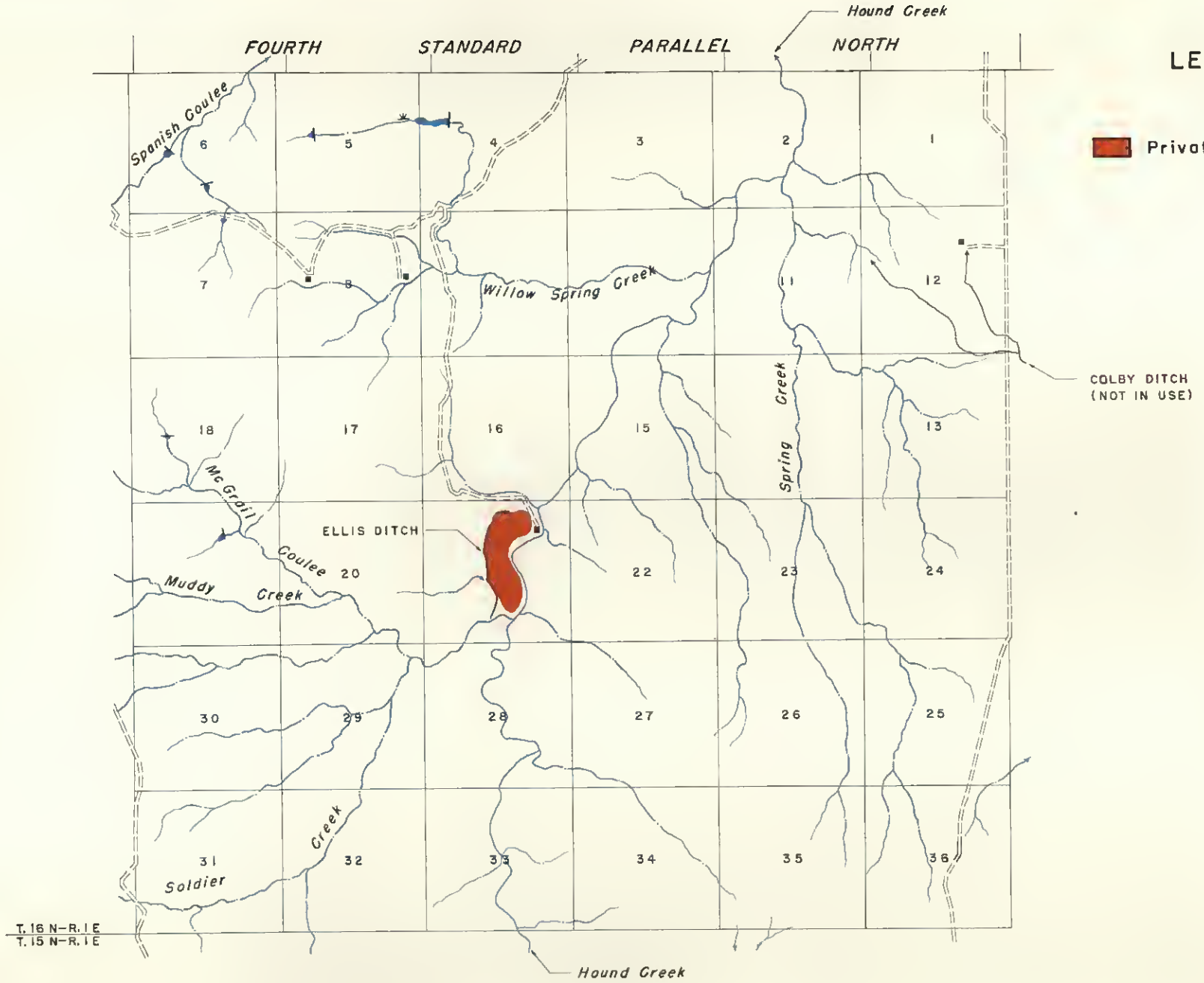
T. 15 N.—R. 1 E & W


Herman Gulch
Spring Coulee
N. Fork Fir Creek
Fir Creek
Porcupine Creek
So. Fork Cottonwood Creek
Trout Creek
Smith River (Deep Creek)
MILLIGAN DITCHES
Coal (Little Trout) Creek
Smith River (Deep Creek)
Trout Creek
T. 15 N R. 2 E
T. 14 N R. 2 E
MEAGHER COUNTY
LEGEND
Private Irrigation

T. 15 N.—R. 3 E


East Fork Willow Creek
FOURTH
STANDARD
PARALLEL
NORTH
Huff Creek
Bird Creek
Creek
MERIDIAN
Willow
STAUNTON DITCHES
Sponish Coulee
Boston
Creek
PRINCIPAL
Soldier Creek
Squaw Creek (N. Fk. West Hound Creek)
T. 16 N–R. 1 W
T. 15 N–R. 1 W
LEGEND
Private Irrigation

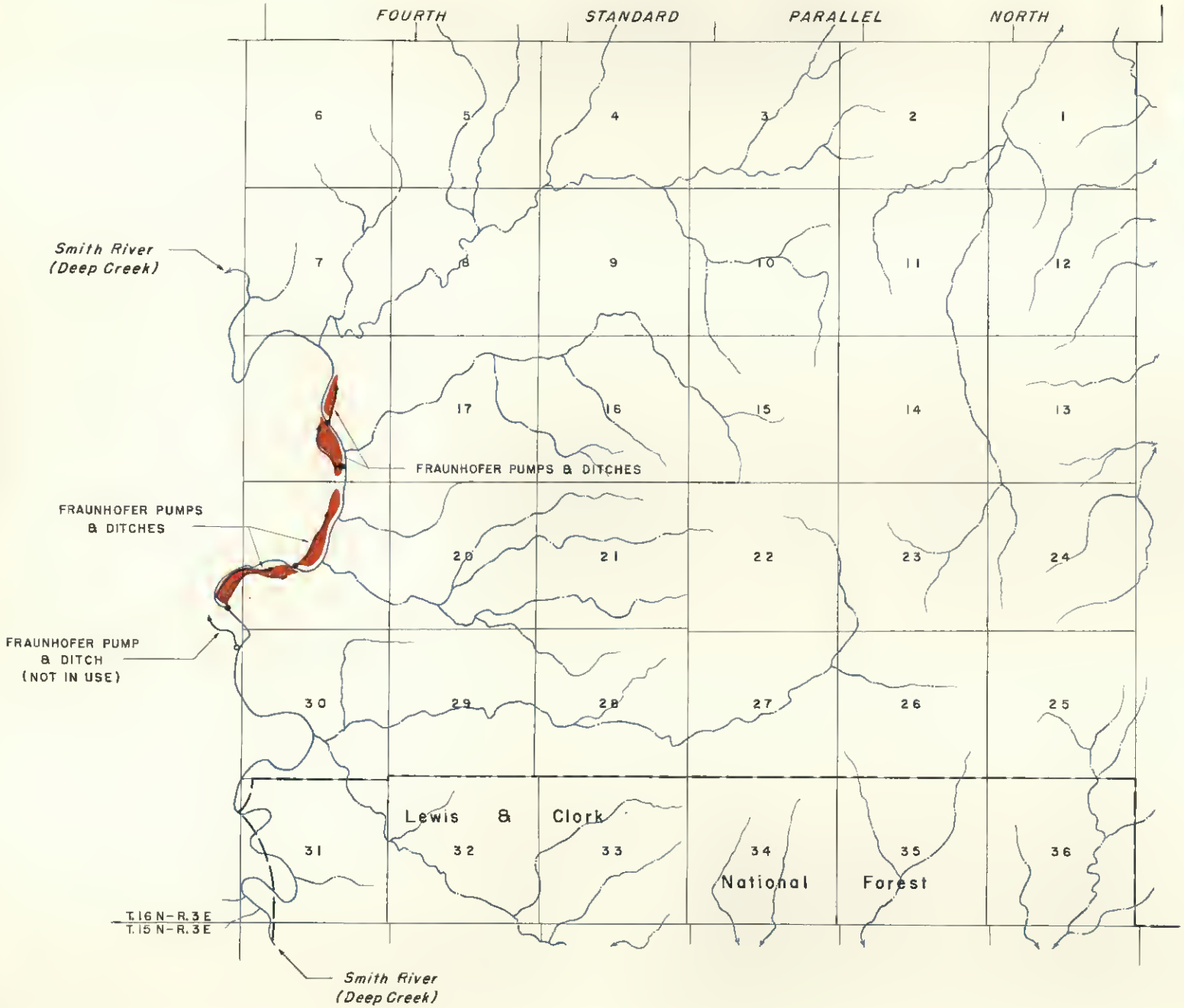
T. 16 N.—R. 1 E



LEGEND

Private Irrigation

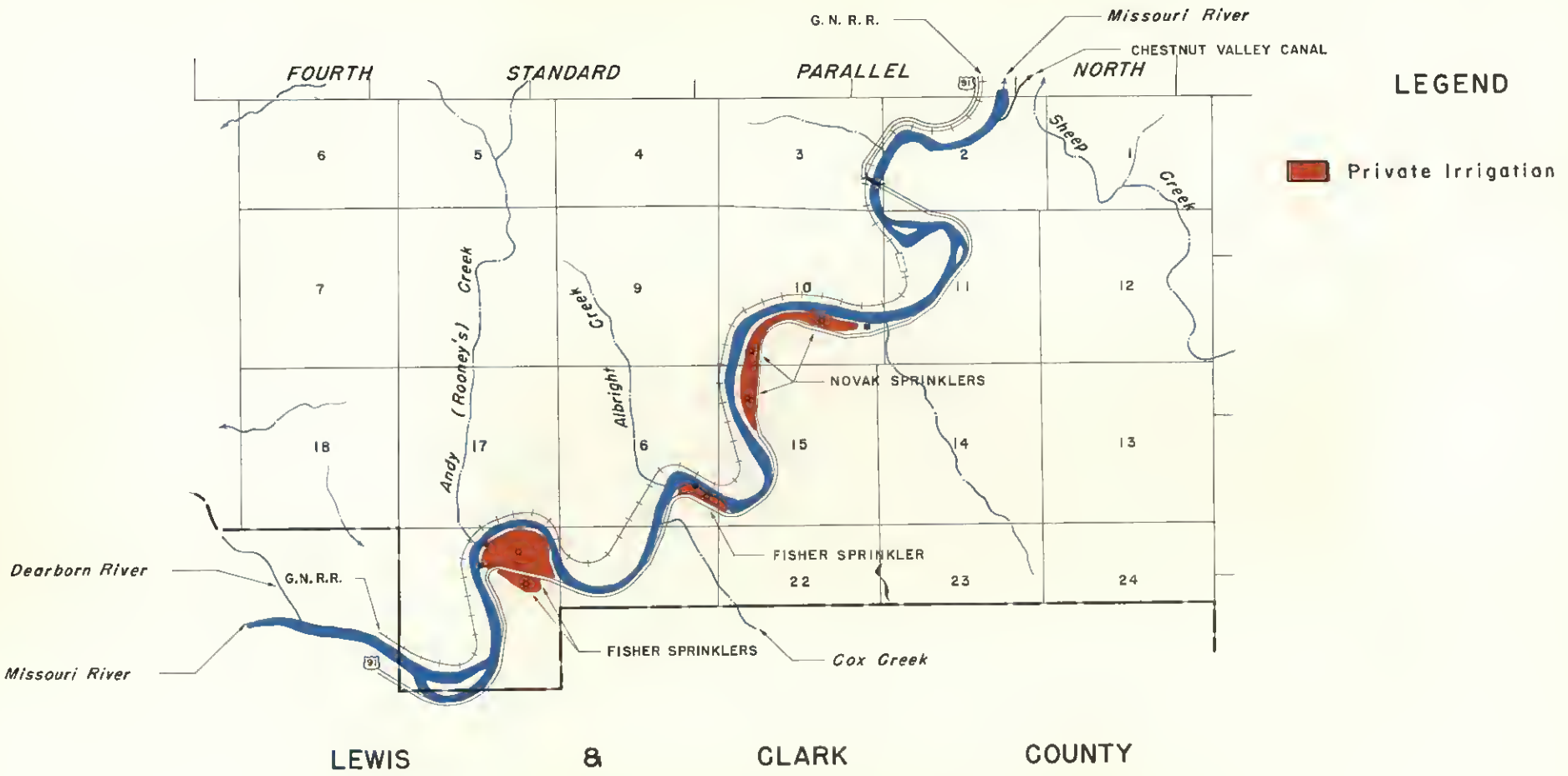
T. 16 N.—R. 2 E



LEGEND

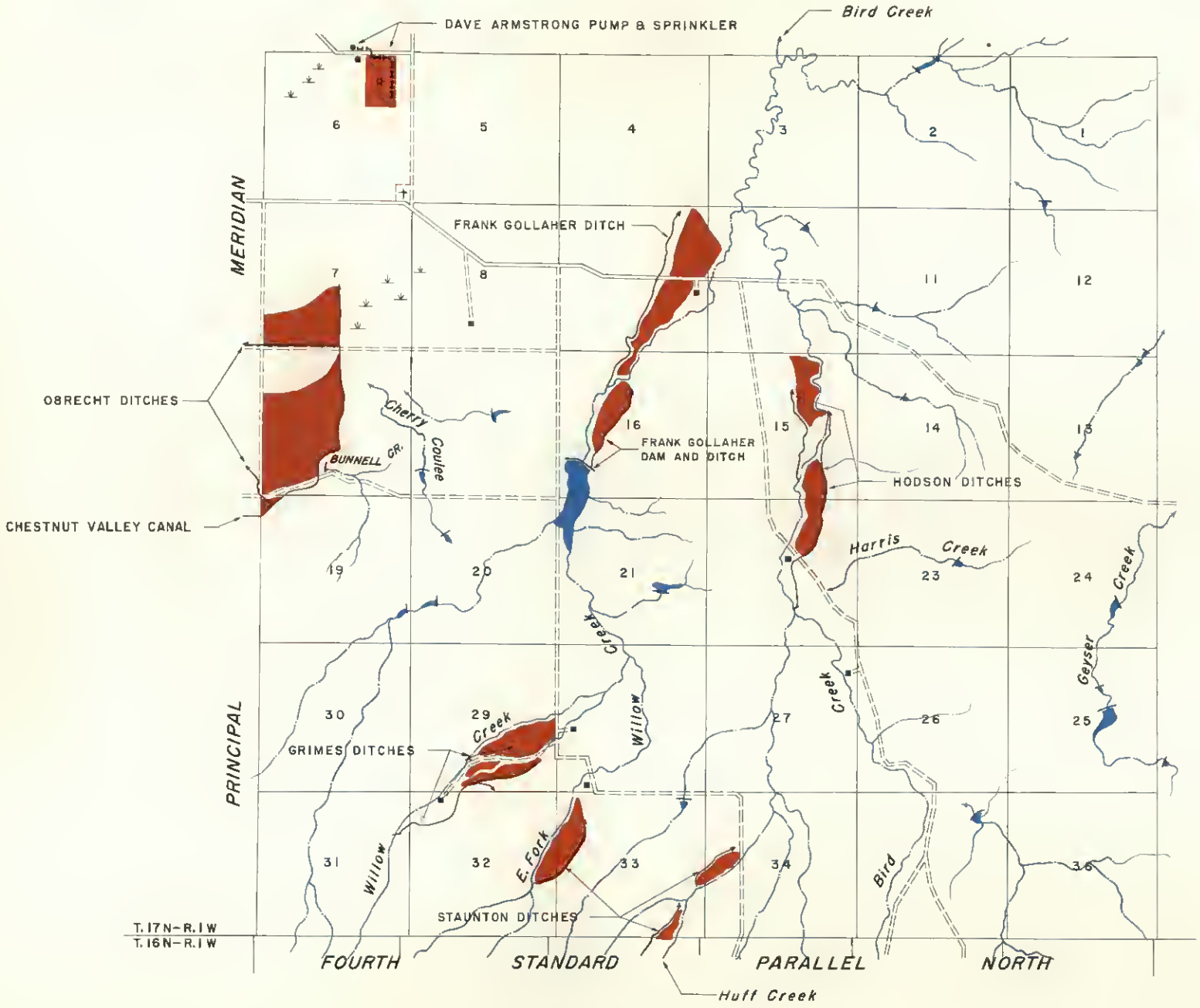
Private Irrigation

T. 16 N.—R. 4 & 3 E



LEWIS & CLARK COUNTY

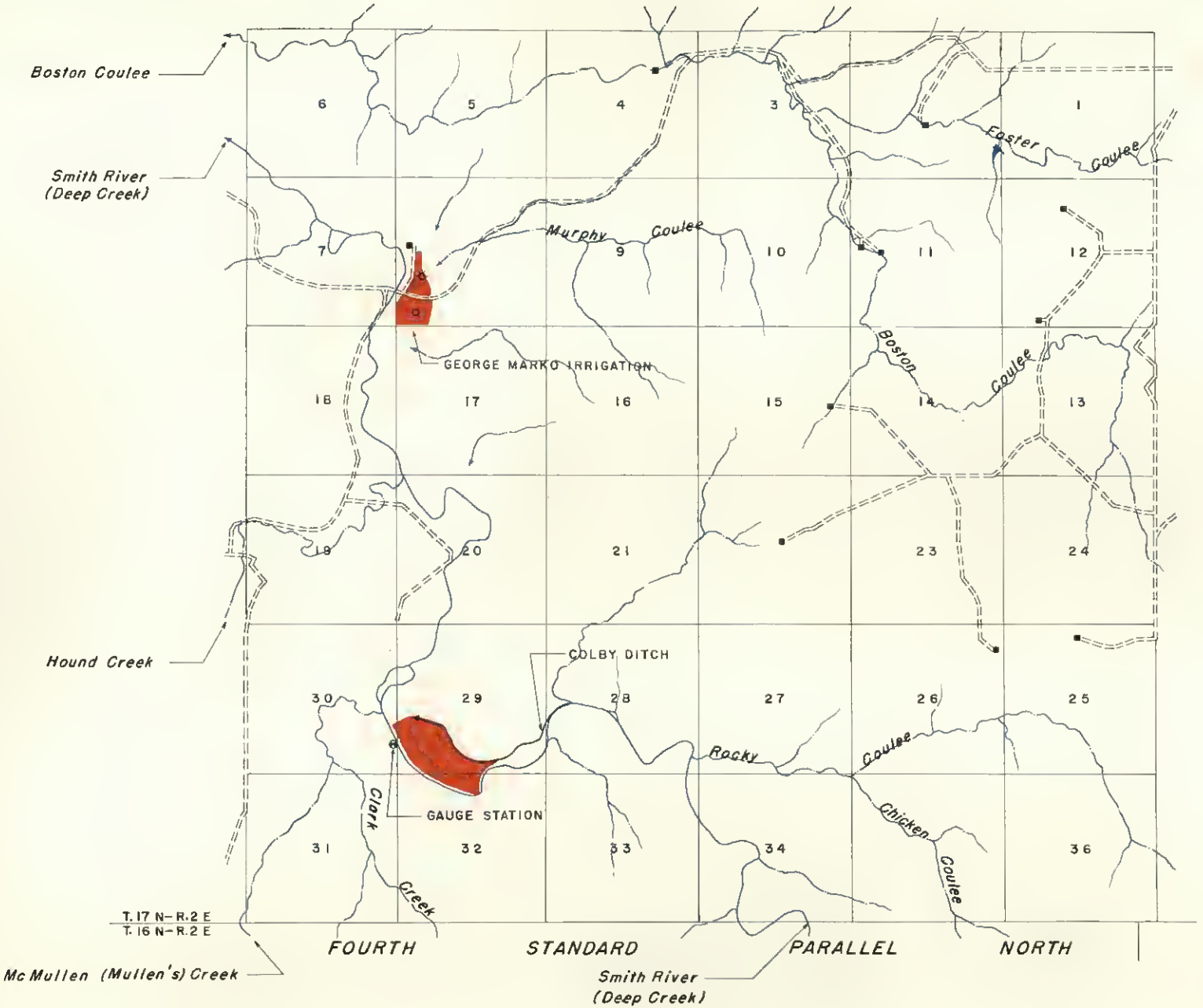
T. 16 N.—R. 2 W



LEGEND

Private Irrigation

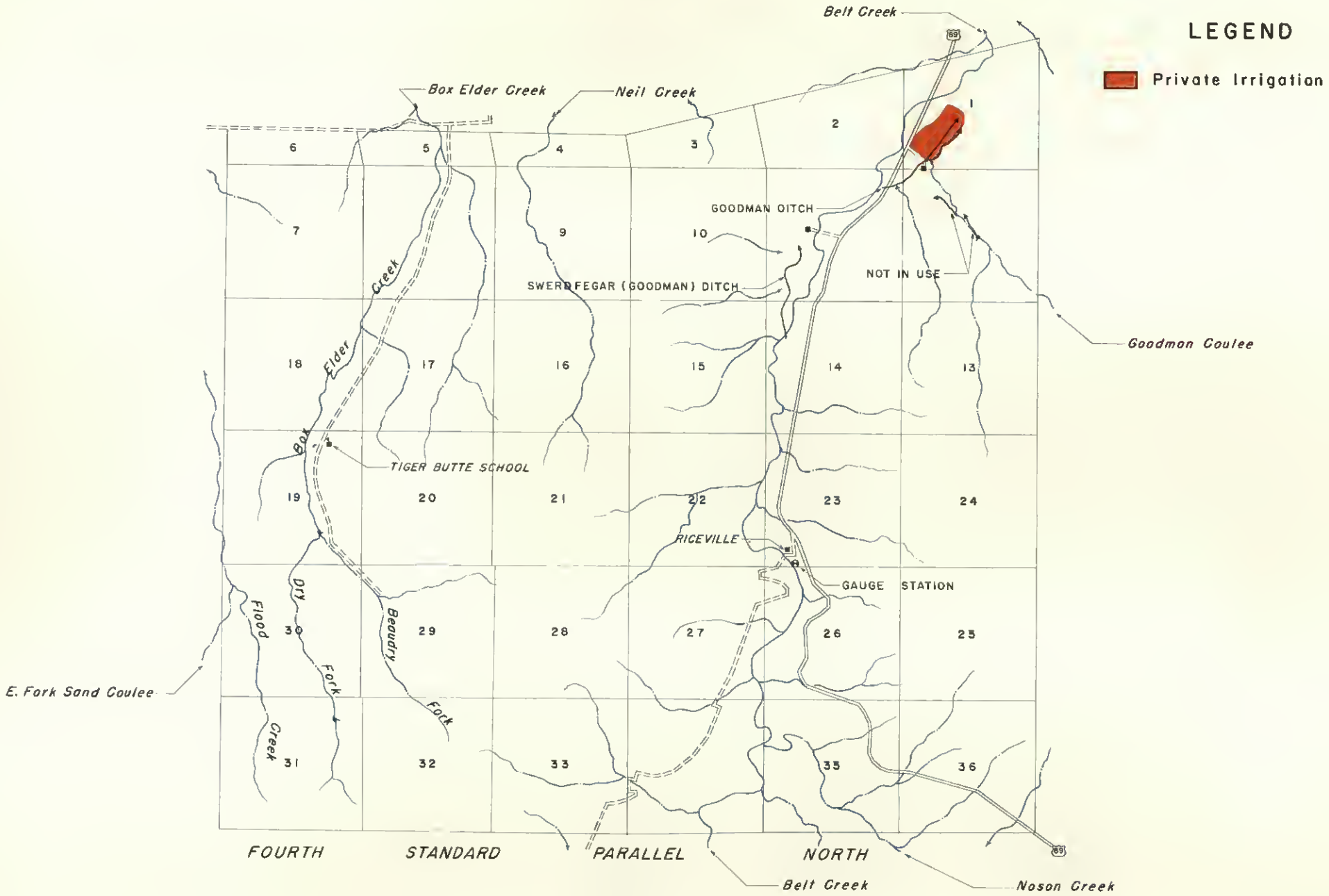
T. 17 N.—R. 1 E



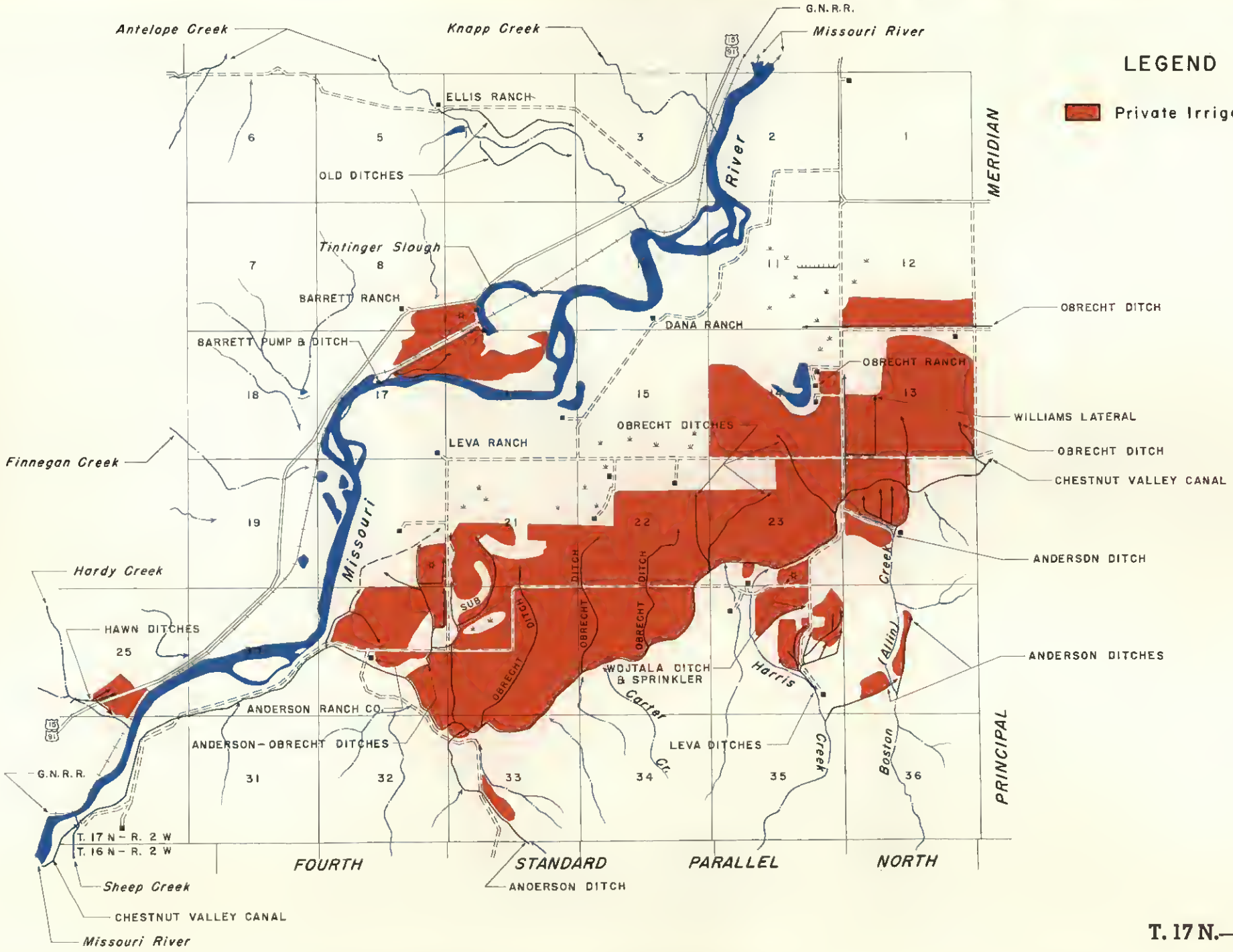
LEGEND

Private Irrigation

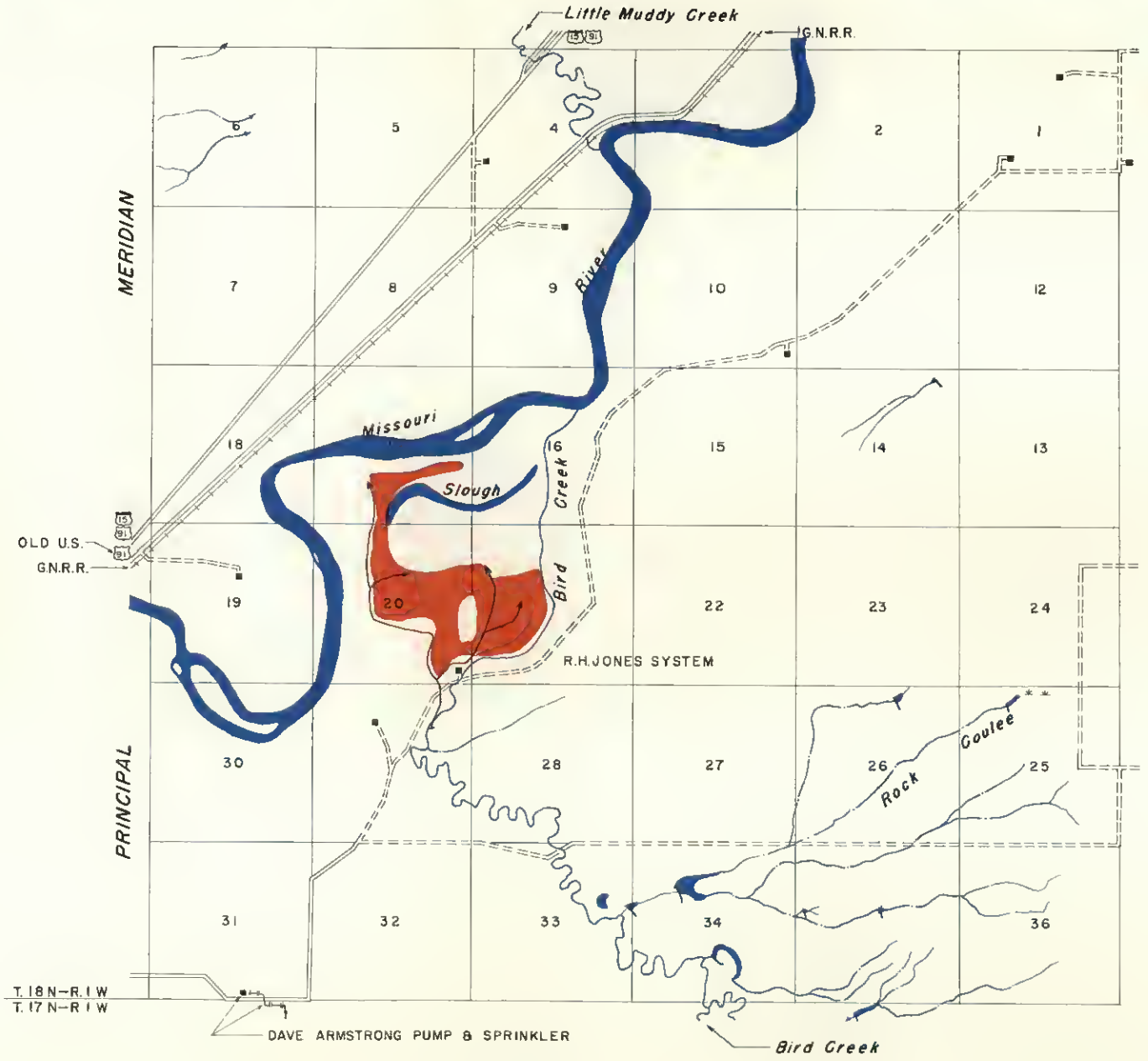
T. 17 N.—R. 3 E


LEGEND
Private Irrigation
Belt Creek
Box Elder Creek
Neil Creek
GOODMAN OITCH
SWERDFEGAR (GOODMAN) DITCH
NOT IN USE
Goodmon Coulee
Box Elder Creek
TIGER BUTTE SCHOOL
RICEVILLE
GAUGE STATION
Dry Beaudry Fork
Flood Creek
E. Fork Sand Coulee
FOURTH STANDARD PARALLEL NORTH
Belt Creek
Noson Creek
1
2
3
4
5
6
7
9
10
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
35
36

T. 17 N.—R. 6 E


Antelope Creek
Knapp Creek
G.N.R.R.
Missouri River
ELLIS RANCH
OLD DITCHES
Tintinger Slough
BARRETT RANCH
BARRETT PUMP & DITCH
DANA RANCH
OBRECHT DITCH
OBRECHT RANCH
WILLIAMS LATERAL
OBRECHT DITCH
CHESTNUT VALLEY CANAL
OBRECHT DITCHES
LEVA RANCH
Finnegan Creek
Missouri River
Hardy Creek
ANDERSON DITCH
HAWN DITCHES
ANDERSON DITCHES
WOJTALA DITCH & SPRINKLER
ANDERSON RANCH CO.
ANDERSON-OBRECHT DITCHES
LEVA DITCHES
G.N.R.R.
T. 17 N - R. 2 W
T. 16 N - R. 2 W
Sheep Creek
CHESTNUT VALLEY CANAL
Missouri River
ANDERSON DITCH
FOURTH STANDARD PARALLEL NORTH
PRINCIPAL MERIDIAN
Harris Creek
Allid
Carter Cr.
Boston Creek
OBRECHT DITCH
SUB OBRECHT DITCH
OBRECHT DITCH
OBRECHT DITCH
1
2
3
5
6
7
8
11
12
13
15
17
18
19
21
22
23
25
31
32
33
34
35
36
LEGEND
Private Irrigation

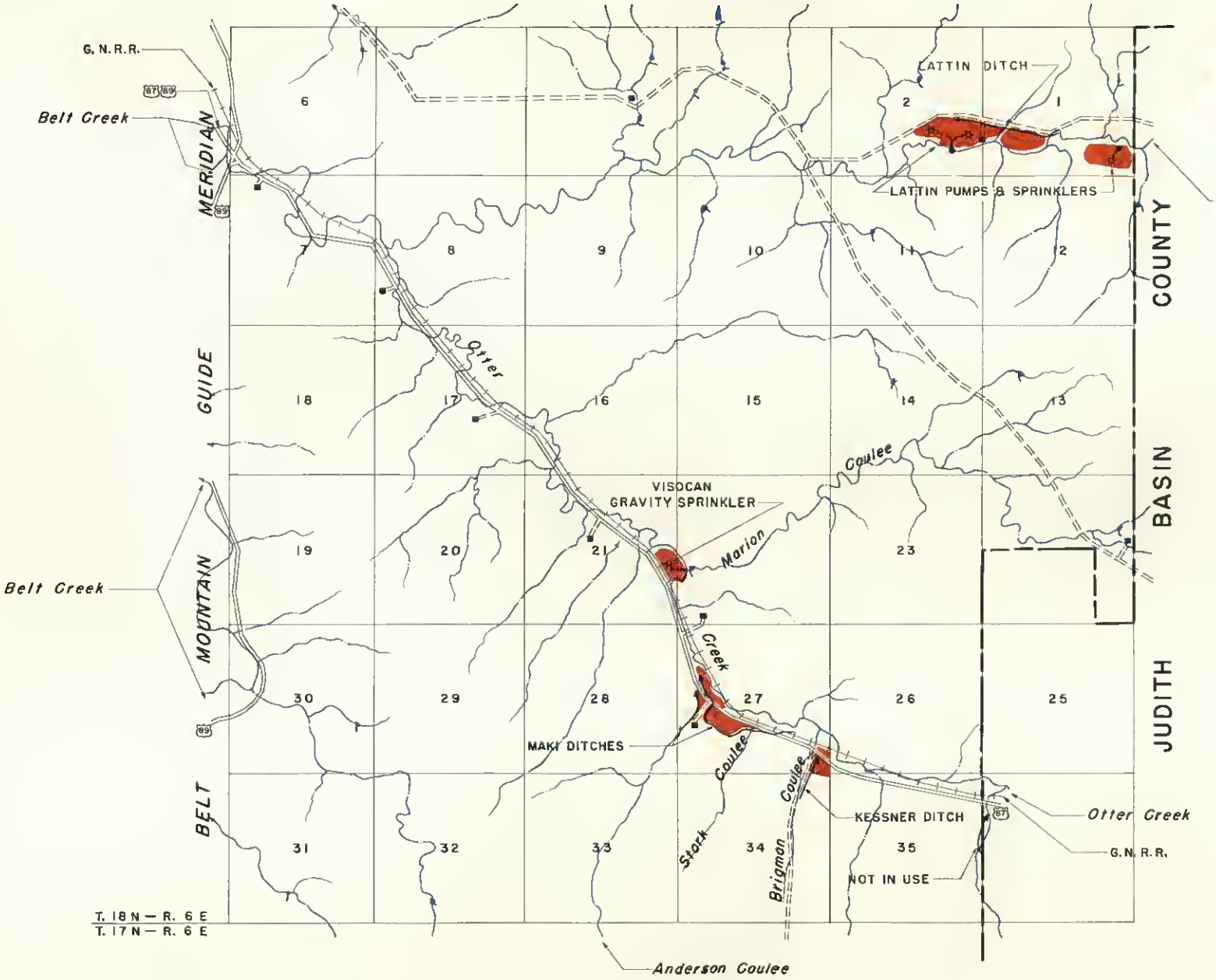
T. 17 N.—R. 1 & 2 W



LEGEND

Private Irrigation

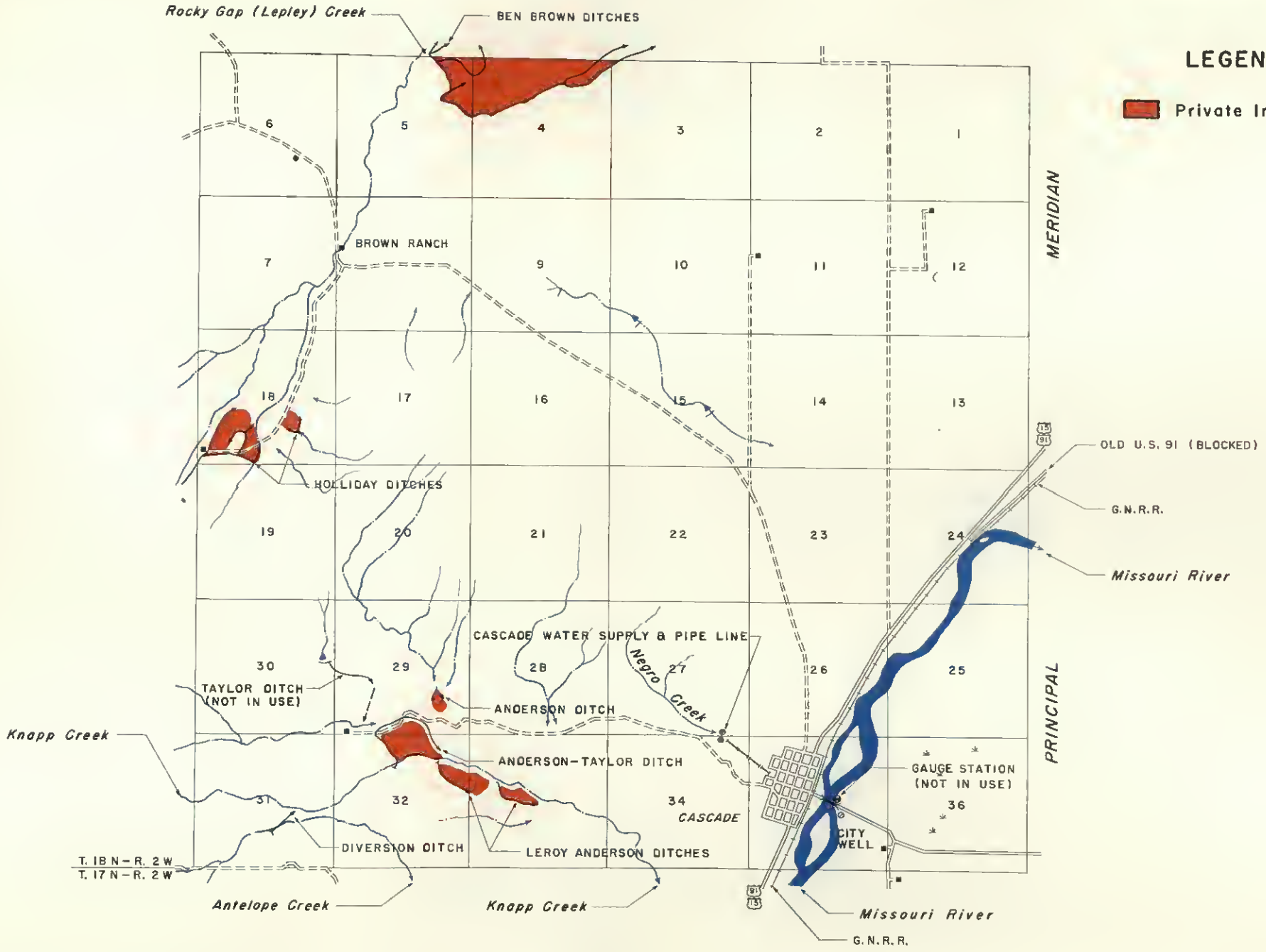
T. 18 N.—R. 1 E



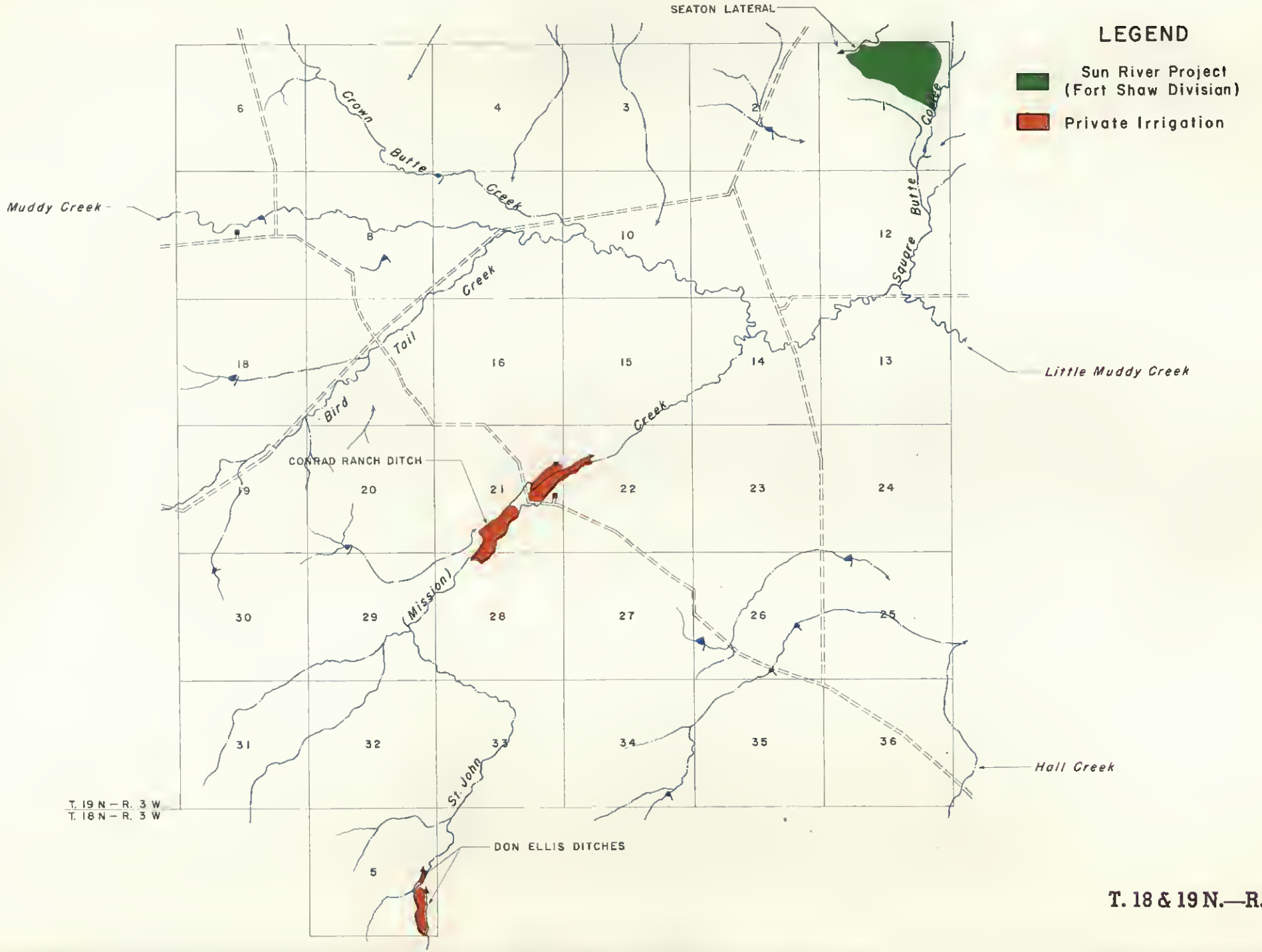
LEGEND

Private Irrigation

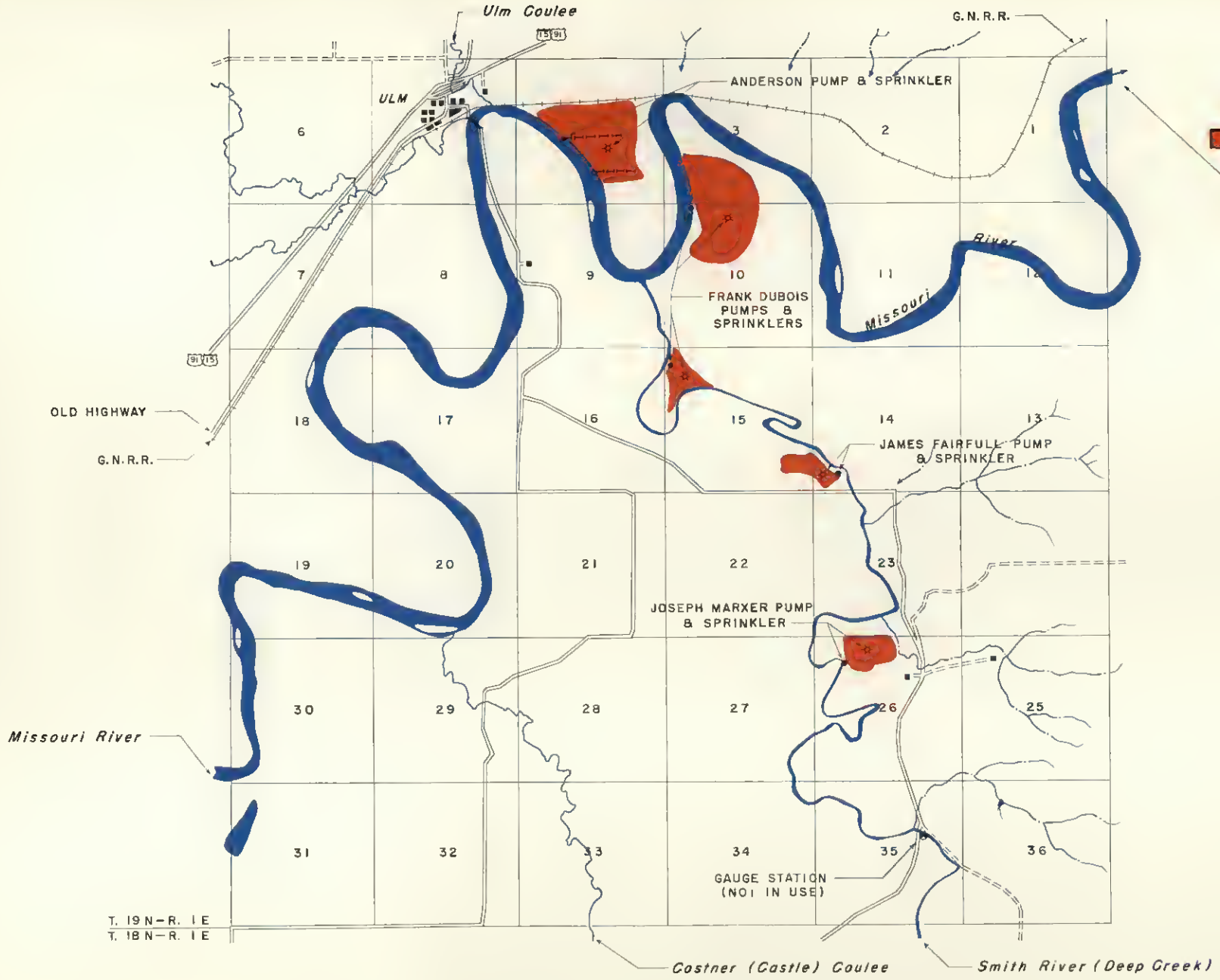
T. 18 N.—R. 7 E


Rocky Gap (Lepley) Creek
BEN BROWN DITCHES
BROWN RANCH
HOLLIDAY DITCHES
CASCADE WATER SUPPLY & PIPE LINE
Negro Creek
TAYLOR DITCH (NOT IN USE)
ANDERSON DITCH
Knapp Creek
ANDERSON-TAYLOR DITCH
DIVERSION DITCH
LEROY ANDERSON DITCHES
CASCADE
T. 18 N.-R. 2 W.
T. 17 N.-R. 2 W.
Antelope Creek
Knapp Creek
OLD U.S. 91 (BLOCKED)
G.N.R.R.
Missouri River
GAUGE STATION (NOT IN USE)
CITY WELL
Missouri River
G.N.R.R.
MERIDIAN
PRINCIPAL
LEGEND
Private Irrigation

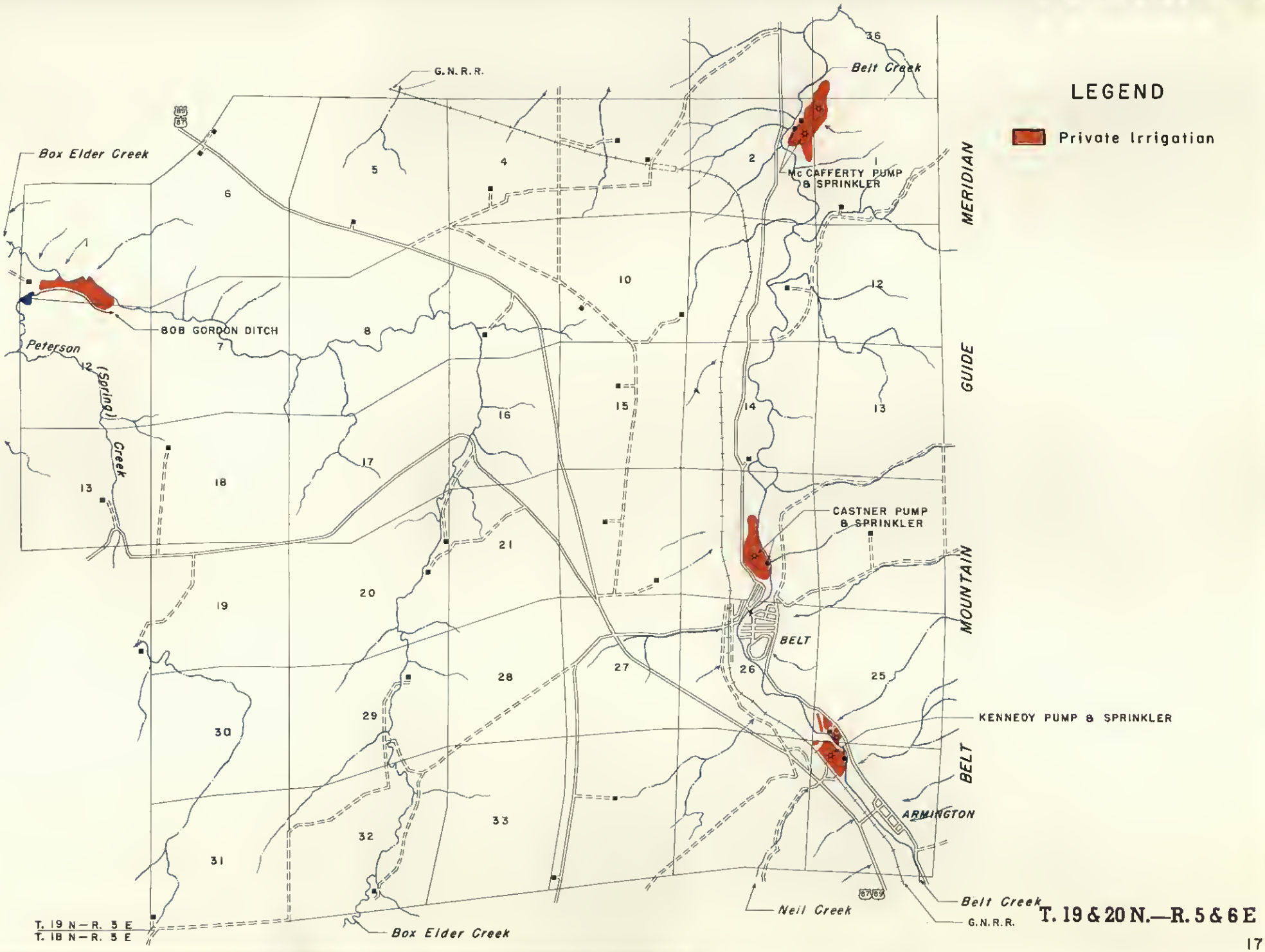
T. 18 N.—R. 1 W

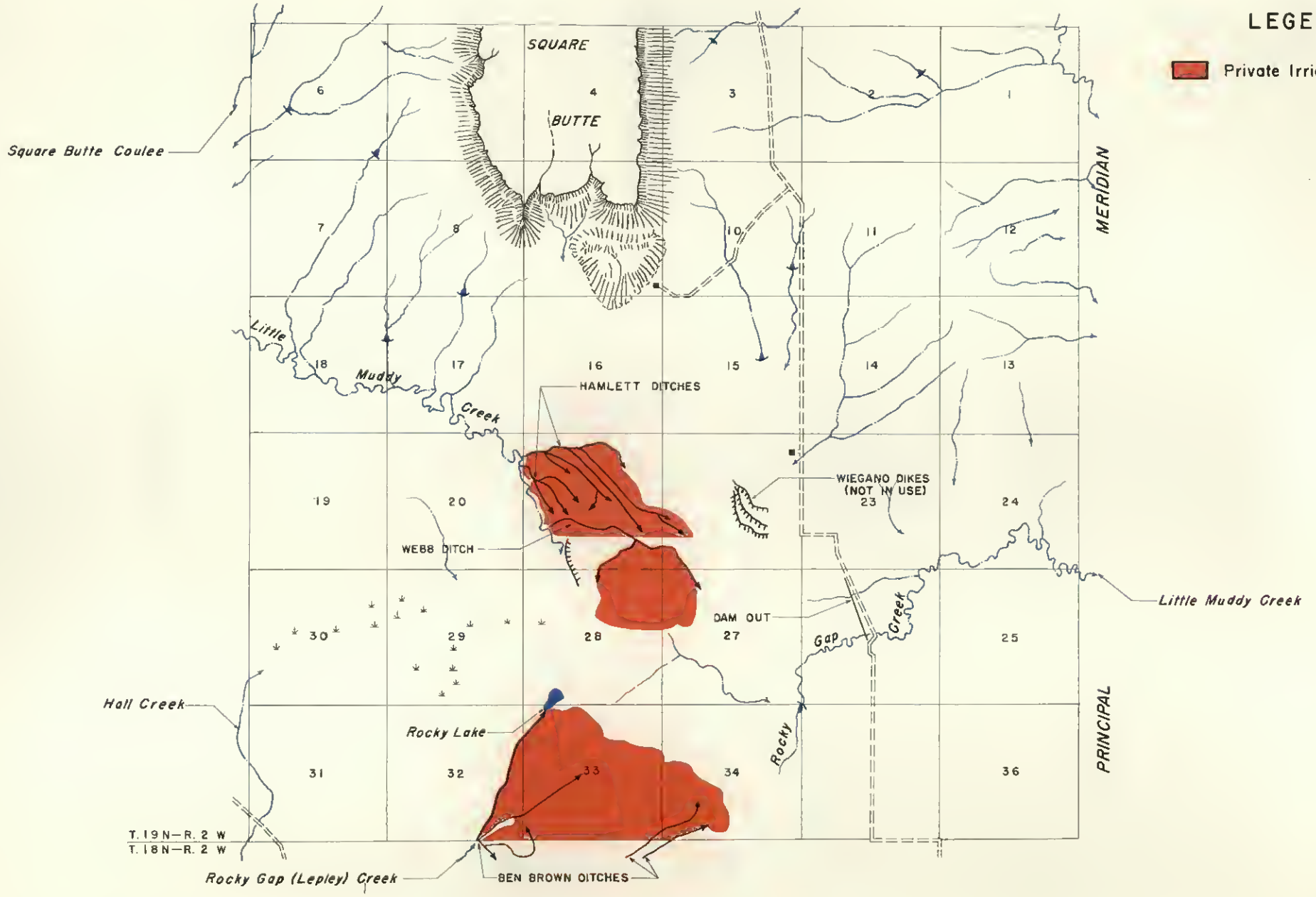

SEATON LATERAL
LEGEND
Sun River Project (Fort Shaw Division)
Private Irrigation
Muddy Creek
Crown Butte Creek
College
Square Butte Creek
Little Muddy Creek
Tail Bird Creek
CONRAD RANCH DITCH
(Mission) Creek
St. John
Hall Creek
DON ELLIS DITCHES
T. 19 N — R. 3 W
T. 18 N — R. 3 W
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

T. 18 & 19 N.—R. 2 W

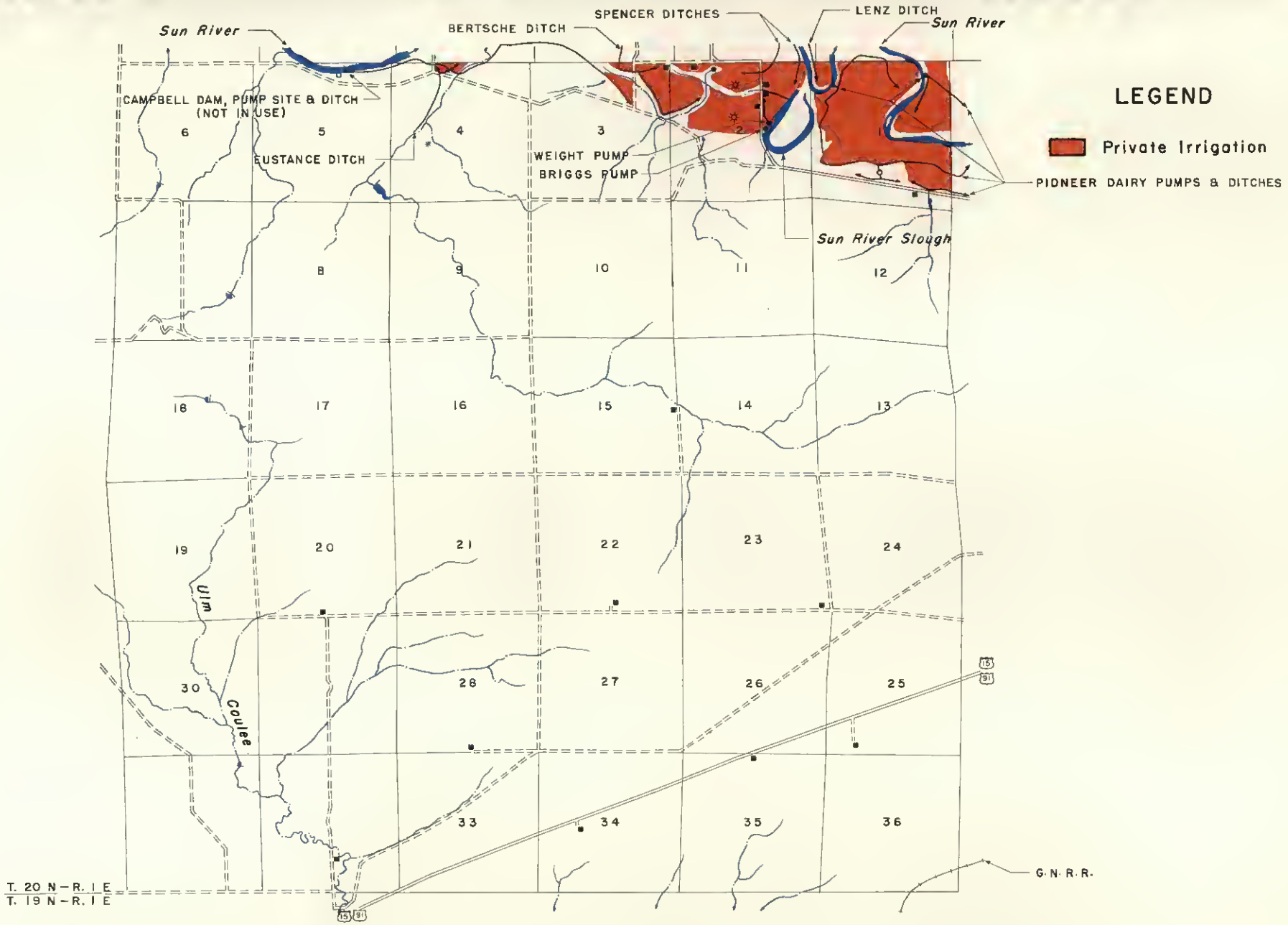

Ulm Coulee
G.N.R.R.
ANDERSON PUMP & SPRINKLER
ULM
LEGEND
Private Irrigation
Missouri River
FRANK DUBOIS PUMPS & SPRINKLERS
Missouri River
OLD HIGHWAY
G.N.R.R.
JAMES FAIRFULL PUMP & SPRINKLER
JOSEPH MARXER PUMP & SPRINKLER
Missouri River
GAUGE STATION (NOT IN USE)
T. 19 N—R. 1 E
T. 18 N—R. 1 E
Costner (Castle) Coulee
Smith River (Deep Creek)

T. 19 N.—R. 2 E

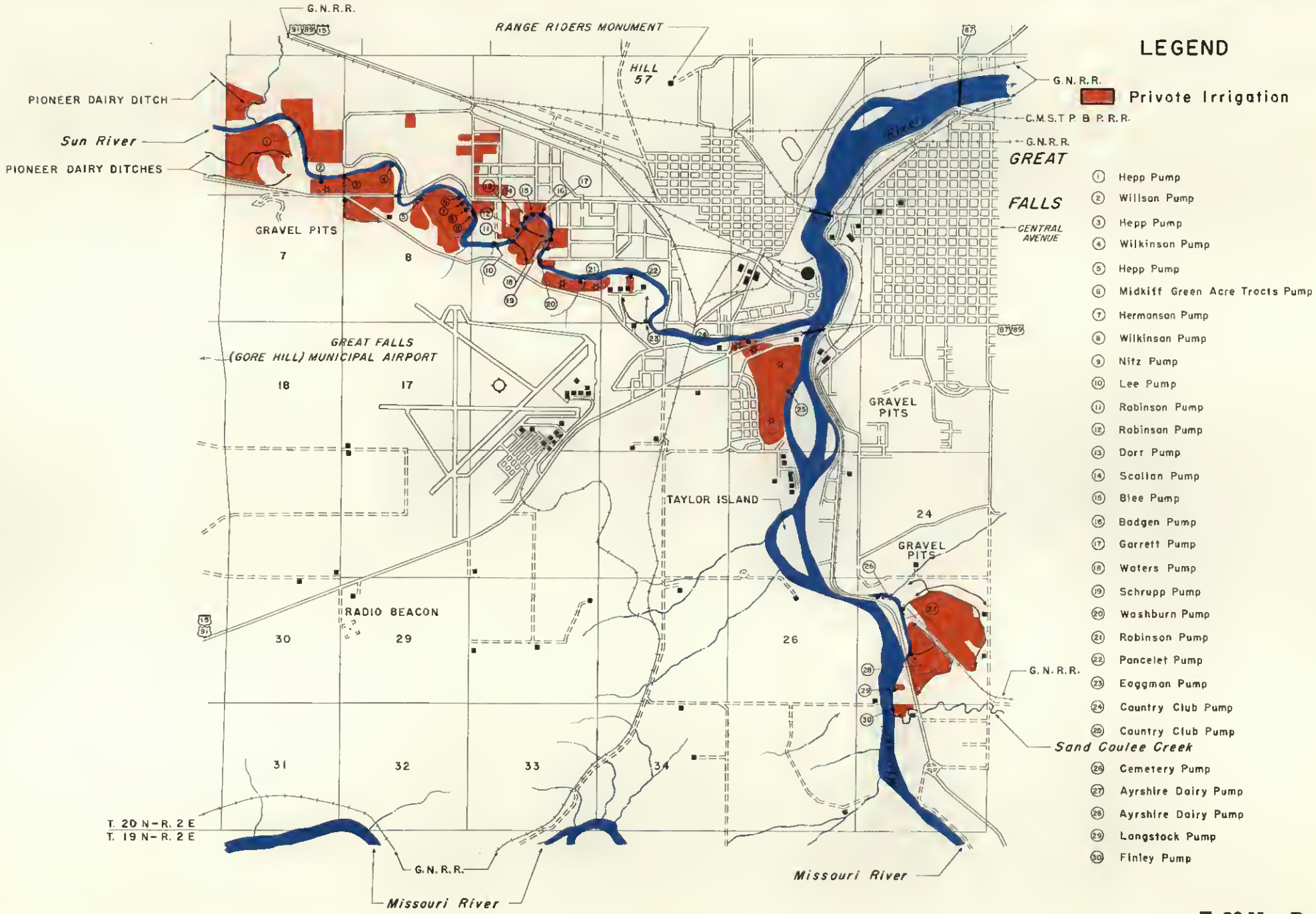

LEGEND
Private Irrigation
G.N.R.R.
Belt Creek
Box Elder Creek
McCAFFERTY PUMP & SPRINKLER
BOB GORDON DITCH
Peterson (Spring) Creek
CASTNER PUMP & SPRINKLER
KENNEDY PUMP & SPRINKLER
BELT
ARMINGTON
Neil Creek
Box Elder Creek
Belt Creek
G.N.R.R.
MERIDIAN
GUIDE
MOUNTAIN
BELT
T. 19 N—R. 5 E
T. 18 N—R. 5 E
T. 19 & 20 N.—R. 5 & 6 E


LEGEND
Private Irrigation
SQUARE
BUTTE
Square Butte Coulee
MERIDIAN
Little
Muddy
Creek
HAMLETT DITCHES
WIEGAND DIKES
(NOT IN USE)
WEBB DITCH
DAM OUT
Little Muddy Creek
Gap
Creek
Hall Creek
Rocky Lake
Rocky
PRINCIPAL
T. 19 N—R. 2 W
T. 18 N—R. 2 W
Rocky Gap (Lepley) Creek
BEN BROWN DITCHES
1
2
3
4
6
7
8
10
11
12
13
14
15
16
17
18
19
20
23
24
25
27
28
29
30
31
32
33
34
36

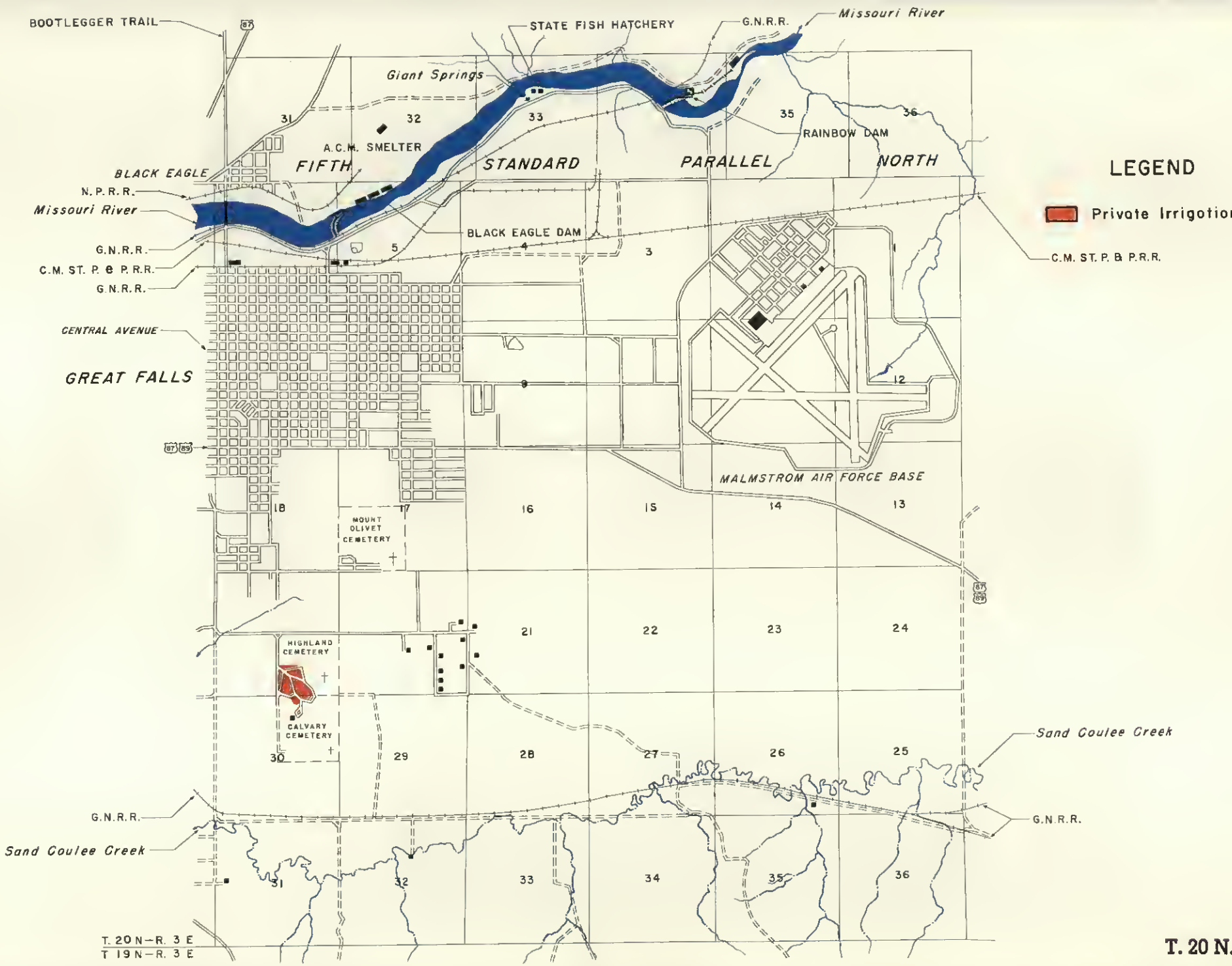
T. 19 N.—R. 1 W

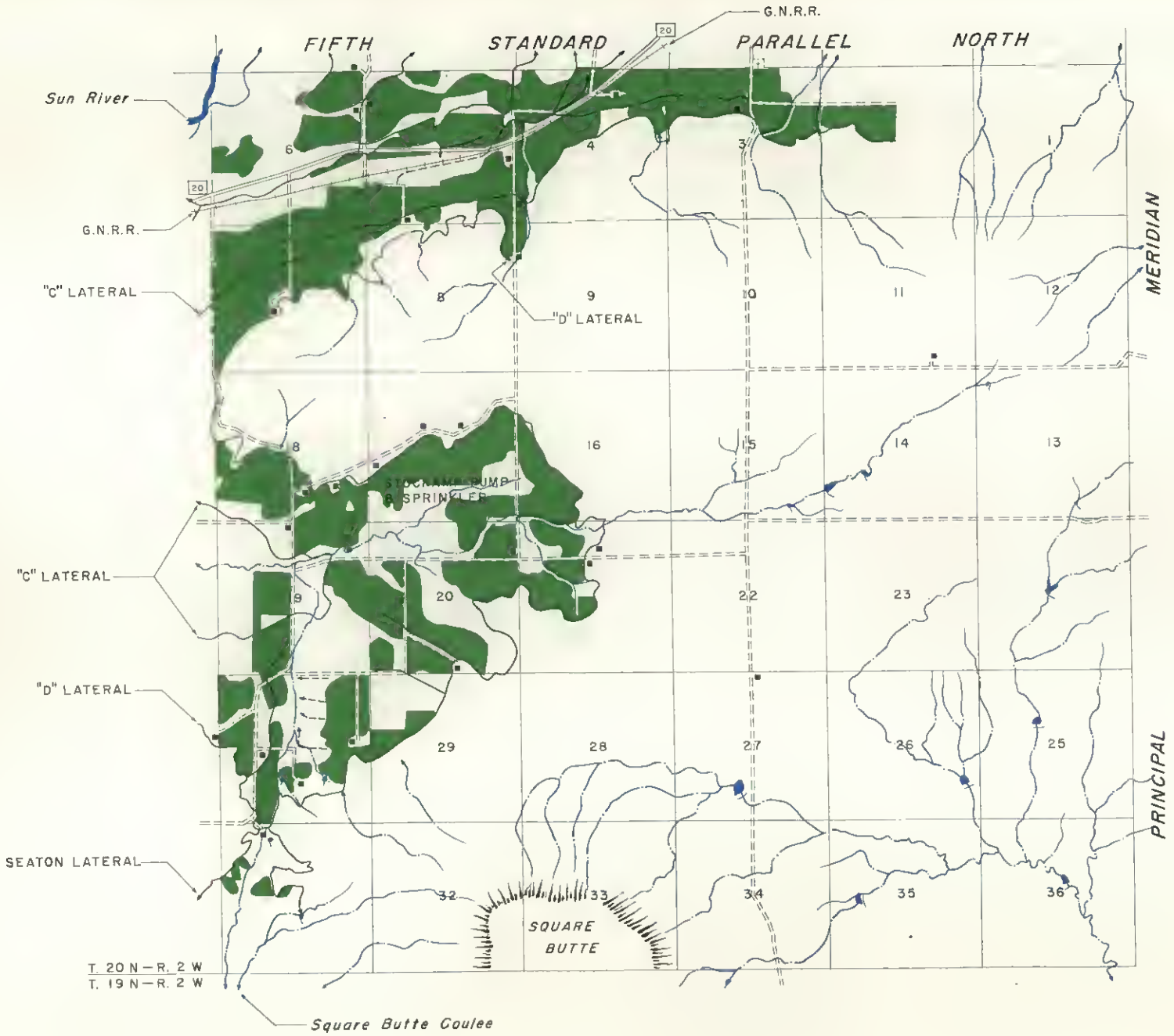

Sun River
BERTSCHE DITCH
SPENCER DITCHES
LENZ DITCH
Sun River
CAMPBELL DAM, PUMP SITE & DITCH
(NOT IN USE)
EUSTANCE DITCH
WEIGHT PUMP
BRIGGS PUMP
PIONEER DAIRY PUMPS & DITCHES
Sun River Slough
LEGEND
Private Irrigation
6
5
4
3
2
1
8
9
10
11
12
18
17
16
15
14
13
19
20
21
22
23
24
30
28
27
26
25
33
34
35
36
Elm
Coulee
15
91
G·N·R·R.
T. 20 N—R. 1 E
T. 19 N—R. 1 E

T. 20 N.—R. 2 E


G. N. R. R.
RANGE RIDERS MONUMENT
HILL 57
PIONEER DAIRY DITCH
Sun River
PIONEER DAIRY DITCHES
GRAVEL PITS
7
8
GREAT FALLS (GORE HILL) MUNICIPAL AIRPORT
18
17
RADIO BEACON
30
29
31
32
33
34
26
24
T. 20 N - R. 2 E
T. 19 N - R. 2 E
G. N. R. R.
Missouri River
TAYLOR ISLAND
GRAVEL PITS
GRAVEL PITS
C. M. S. T. P. & P. R. R.
G. N. R. R.
GREAT FALLS
CENTRAL AVENUE
G. N. R. R.
Sand Coulee Creek
Missouri River
LEGEND
Private Irrigation
1 Hepp Pump
2 Willson Pump
3 Hepp Pump
4 Wilkinson Pump
5 Hepp Pump
6 Midkiff Green Acre Tracts Pump
7 Hermanson Pump
8 Wilkinson Pump
9 Nitz Pump
10 Lee Pump
11 Robinson Pump
12 Robinson Pump
13 Dorr Pump
14 Scallan Pump
15 Blee Pump
16 Badgen Pump
17 Garrett Pump
18 Waters Pump
19 Schrupp Pump
20 Washburn Pump
21 Robinson Pump
22 Poncelet Pump
23 Eggman Pump
24 Country Club Pump
25 Country Club Pump
26 Cemetery Pump
27 Ayrshire Dairy Pump
28 Ayrshire Dairy Pump
29 Longstock Pump
30 Finley Pump

T. 20 N.—R. 3 E

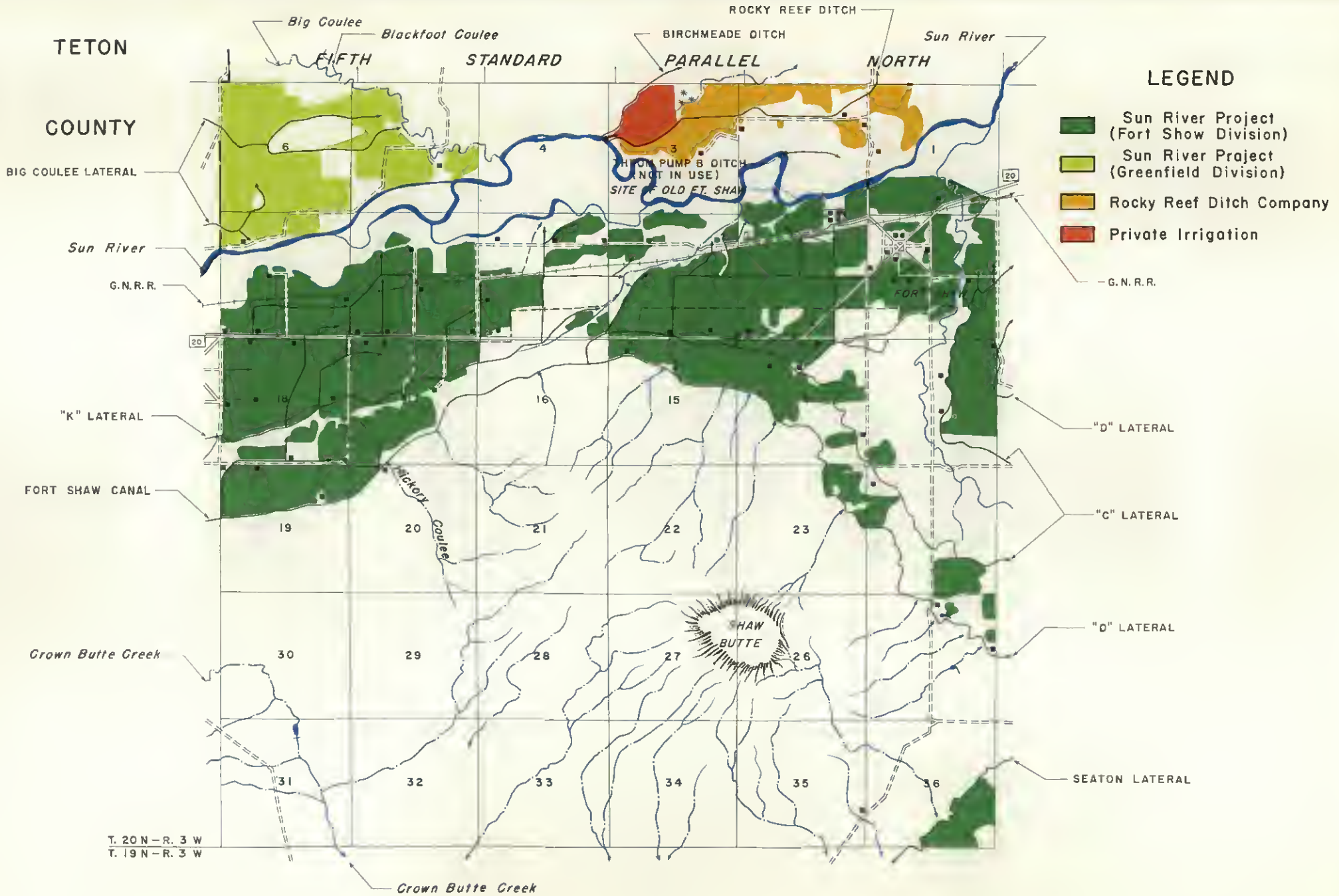

BOOTLEGGER TRAIL
STATE FISH HATCHERY
G.N.R.R.
Missouri River
Giant Springs
A.C.M. SMELTER
FIFTH STANDARD PARALLEL NORTH
RAINBOW DAM
BLACK EAGLE
N. P. R. R.
Missouri River
BLACK EAGLE DAM
G.N.R.R.
C.M. ST. P. & P.R.R.
G.N.R.R.
C.M. ST. P. & P.R.R.
CENTRAL AVENUE
GREAT FALLS
MALMSTROM AIR FORCE BASE
MOUNT OLIVET CEMETERY
HIGHLAND CEMETERY
CALVARY CEMETERY
Sand Coulee Creek
G.N.R.R.
Sand Coulee Creek
G.N.R.R.
T. 20 N—R. 3 E
T 19 N—R. 3 E
LEGEND
Private Irrigation
T. 20 N.—R. 4 E



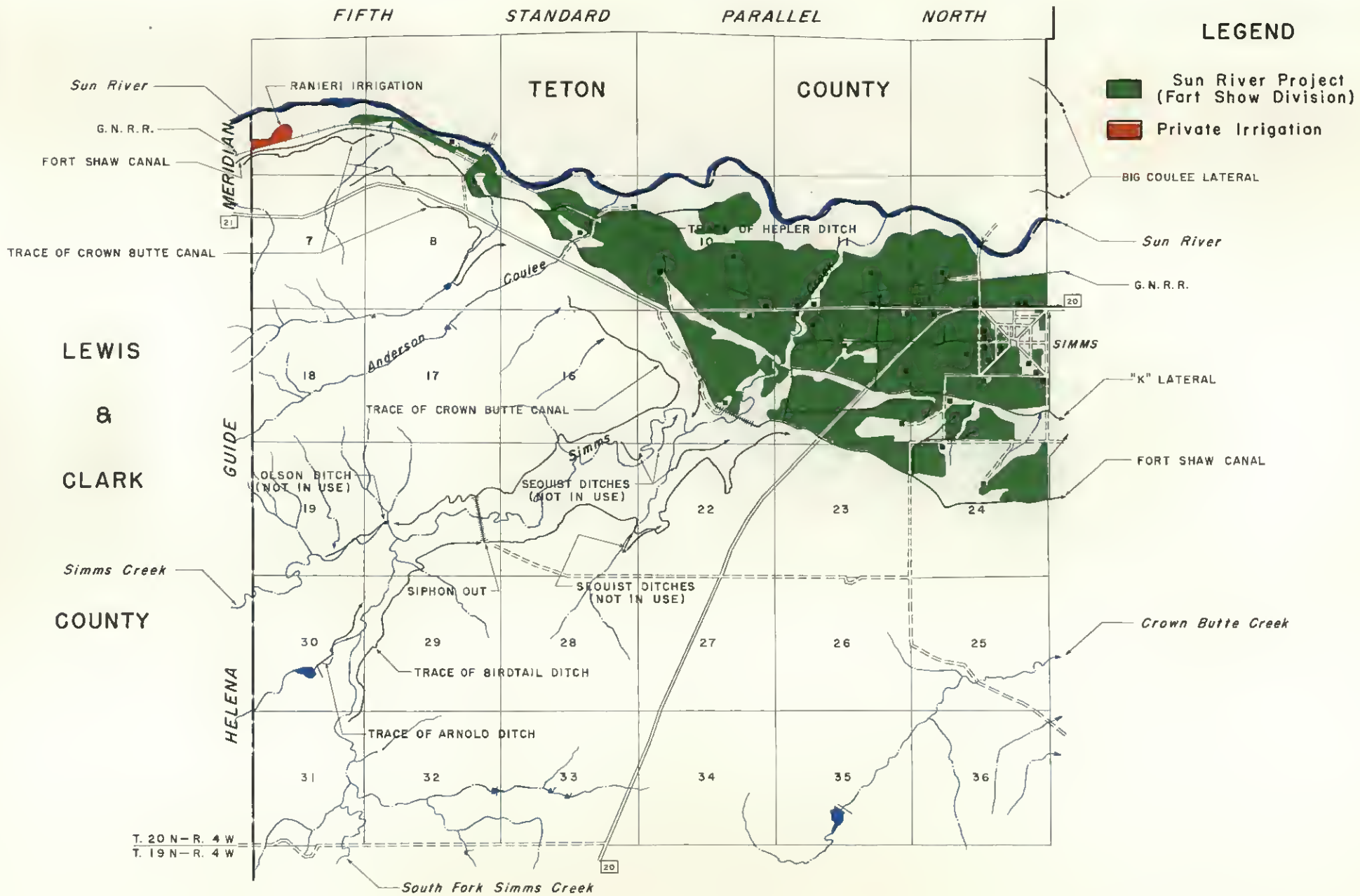
LEGEND

Sun River Project
(Fort Shaw Division)

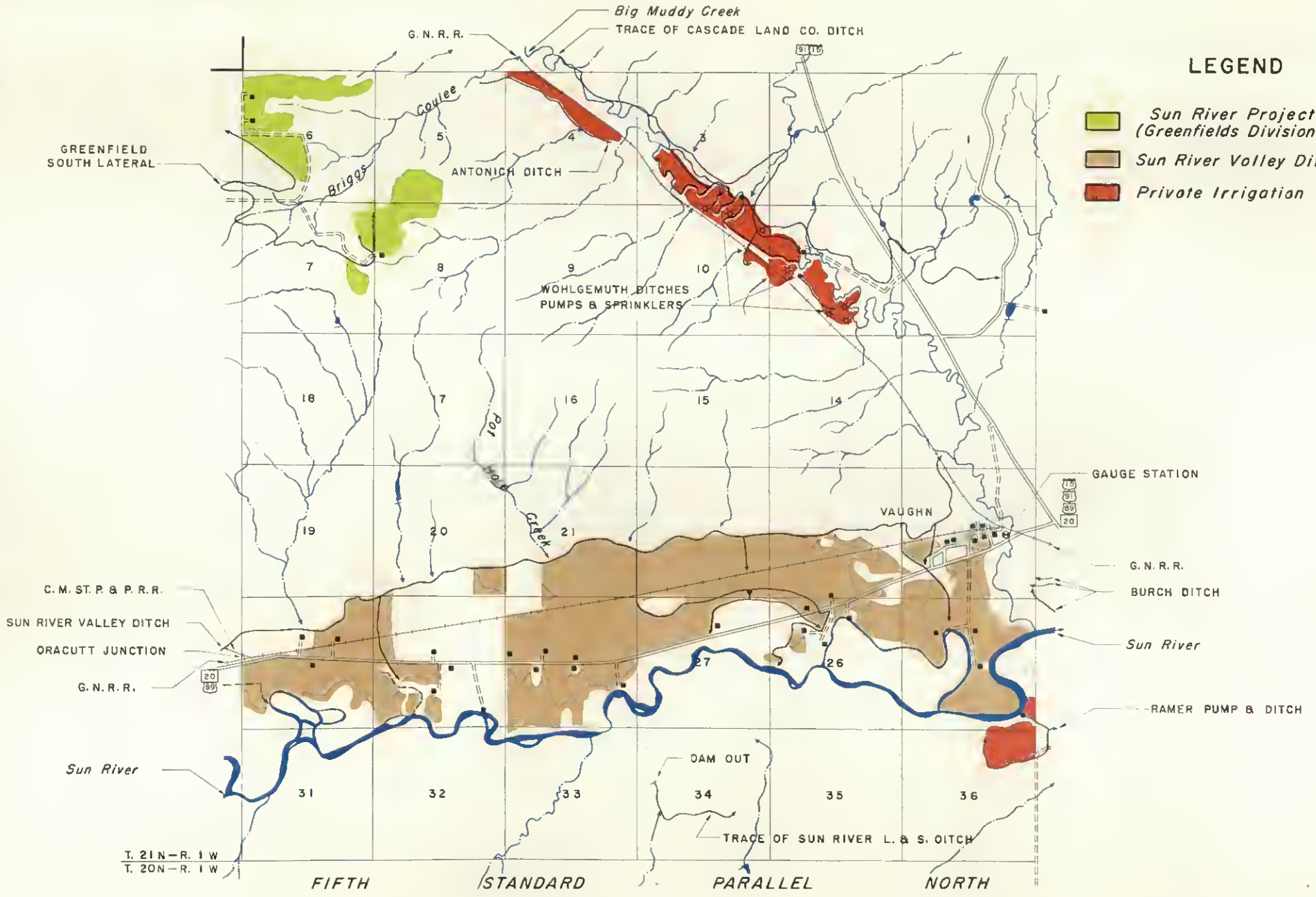
T. 20 N.—R. 1 W


TETON
COUNTY
Big Coulee
Blackfoot Coulee
ROCKY REEF DITCH
BIRCHMEADE DITCH
Sun River
FIFTH
STANDARD
PARALLEL
NORTH
BIG COULEE LATERAL
Sun River
G.N.R.R.
"K" LATERAL
FORT SHAW CANAL
Crown Butte Creek
T. 20 N.—R. 3 W
T. 19 N.—R. 3 W
Crown Butte Creek
SITE OF OLD FT. SHAW
FORT SHAW
Hickory Coulee
SHAW BUTTE
"D" LATERAL
"C" LATERAL
"D" LATERAL
SEATON LATERAL
G.N.R.R.
LEGEND
Sun River Project (Fort Show Division)
Sun River Project (Greenfield Division)
Rocky Reef Ditch Company
Private Irrigation

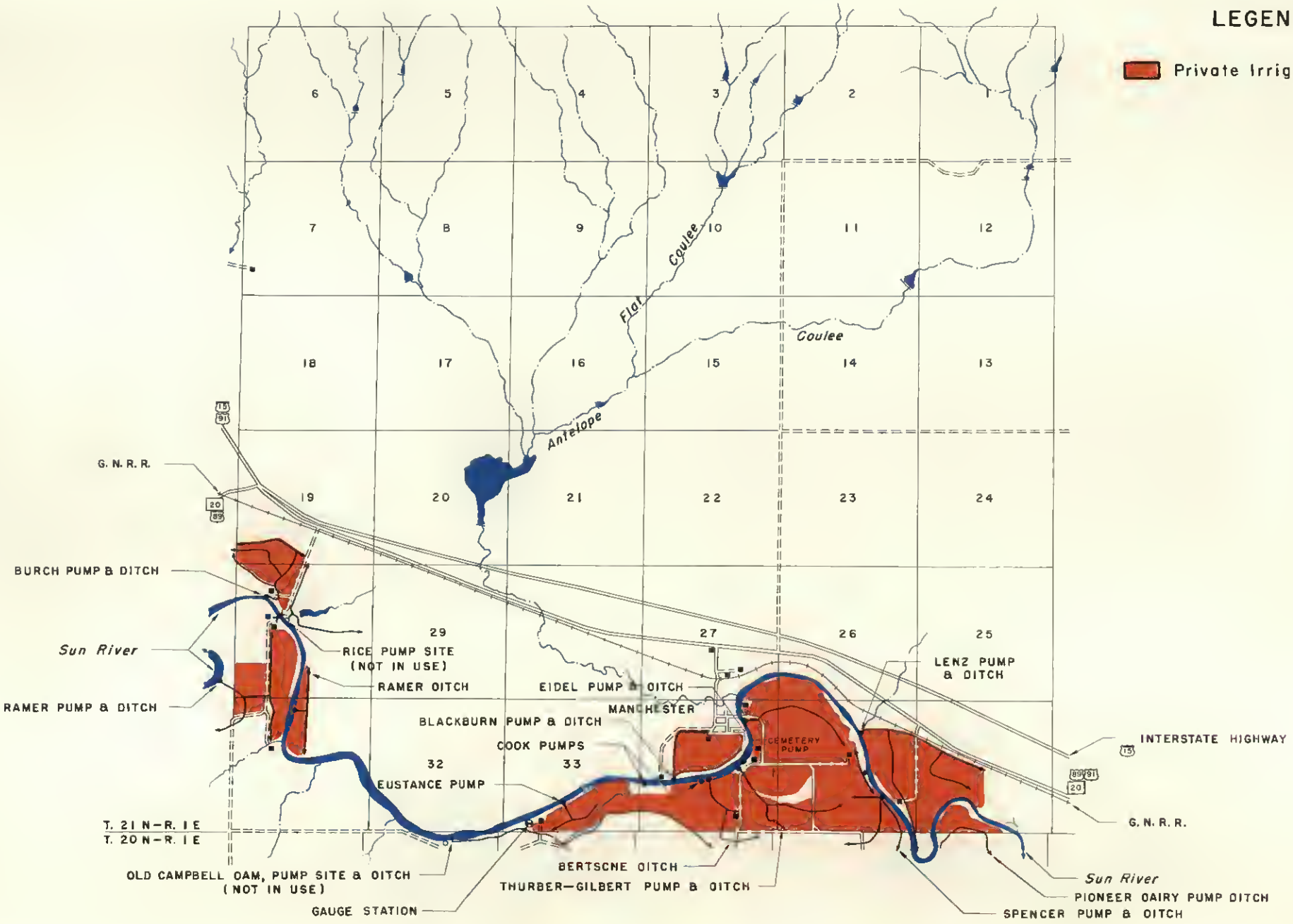
T. 20 N.—R. 2 W


FIFTH STANDARD PARALLEL NORTH
TETON COUNTY
LEGEND
Sun River Project (Fort Show Division)
Private Irrigation
Sun River
RANIERI IRRIGATION
G. N. R. R.
FORT SHAW CANAL
MERIDIAN
TRACE OF CROWN BUTTE CANAL
BIG COULEE LATERAL
TRACE OF HEPLER DITCH
Sun River
G. N. R. R.
SIMMS
"K" LATERAL
FORT SHAW CANAL
Coulee
Anderson
Simms
LEWIS & CLARK COUNTY
GUIDE
OLSON DITCH (NOT IN USE)
SEQUIST DITCHES (NOT IN USE)
Simms Creek
SIPHON OUT
SEQUIST DITCHES (NOT IN USE)
Crown Butte Creek
HELENA
TRACE OF BIRDTAIL DITCH
TRACE OF ARNOLD DITCH
T. 20 N—R. 4 W
T. 19 N—R. 4 W
South Fork Simms Creek
7
8
10
11
18
17
16
19
22
23
24
30
29
28
27
26
25
31
32
33
34
35
36
20
21

T. 20 N.—R. 3 W


Big Muddy Creek
TRACE OF CASCADE LAND CO. DITCH
G. N. R. R.
GREENFIELD SOUTH LATERAL
Coulee
Briggs
ANTONICH DITCH
WOHLGEMUTH DITCHES PUMPS & SPRINKLERS
Pot Hole Creek
GAUGE STATION
VAUGHN
G. N. R. R.
BURCH DITCH
C. M. ST. P. & P. R. R.
SUN RIVER VALLEY DITCH
ORACUTT JUNCTION
G. N. R. R.
Sun River
RAMER PUMP & DITCH
Sun River
DAM OUT
TRACE OF SUN RIVER L. & S. DITCH
T. 21 N—R. 1 W
T. 20N—R. 1 W
FIFTH STANDARD PARALLEL NORTH
LEGEND
Sun River Project (Greenfields Division)
Sun River Volley Ditch Co.
Private Irrigation

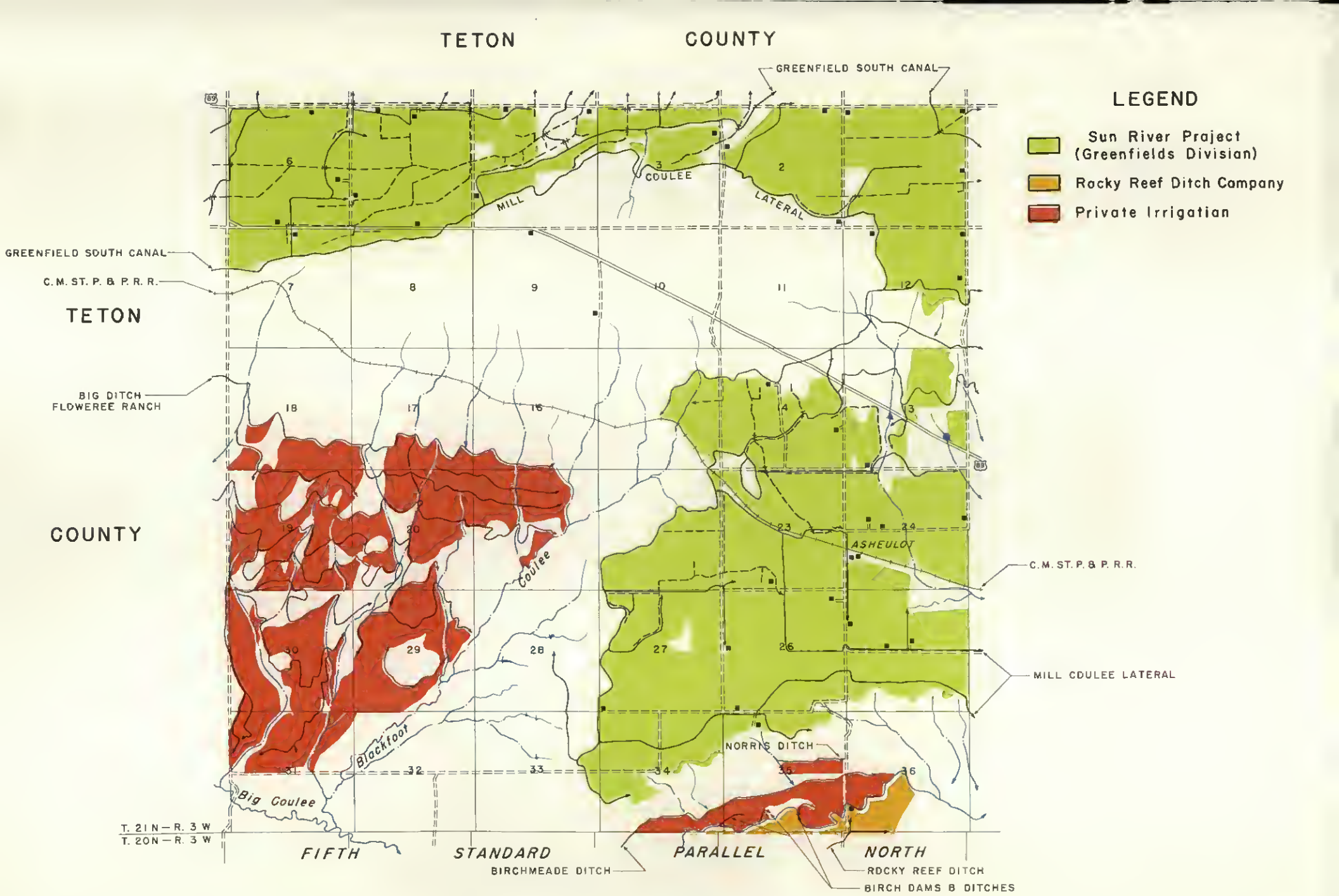
T. 21 N.—R. 1 E


LEGEND
Private Irrigation
6
5
4
3
2
1
7
8
9
10
11
12
18
17
16
15
14
13
19
20
21
22
23
24
29
27
26
25
32
33
Flat Coulee
Coulee
Antelope
G. N. R. R.
BURCH PUMP & DITCH
Sun River
RICE PUMP SITE
(NOT IN USE)
RAMER DITCH
RAMER PUMP & DITCH
EIDEL PUMP & DITCH
MANCHESTER
BLACKBURN PUMP & DITCH
COOK PUMPS
EUSTANCE PUMP
CEMETERY PUMP
LENZ PUMP
& DITCH
INTERSTATE HIGHWAY
G. N. R. R.
T. 21 N.—R. 1 E.
T. 20 N.—R. 1 E.
OLD CAMPBELL OAM, PUMP SITE & DITCH
(NOT IN USE)
GAUGE STATION
BERTSCHE DITCH
THURBER—GILBERT PUMP & DITCH
Sun River
PIONEER DAIRY PUMP DITCH
SPENCER PUMP & DITCH

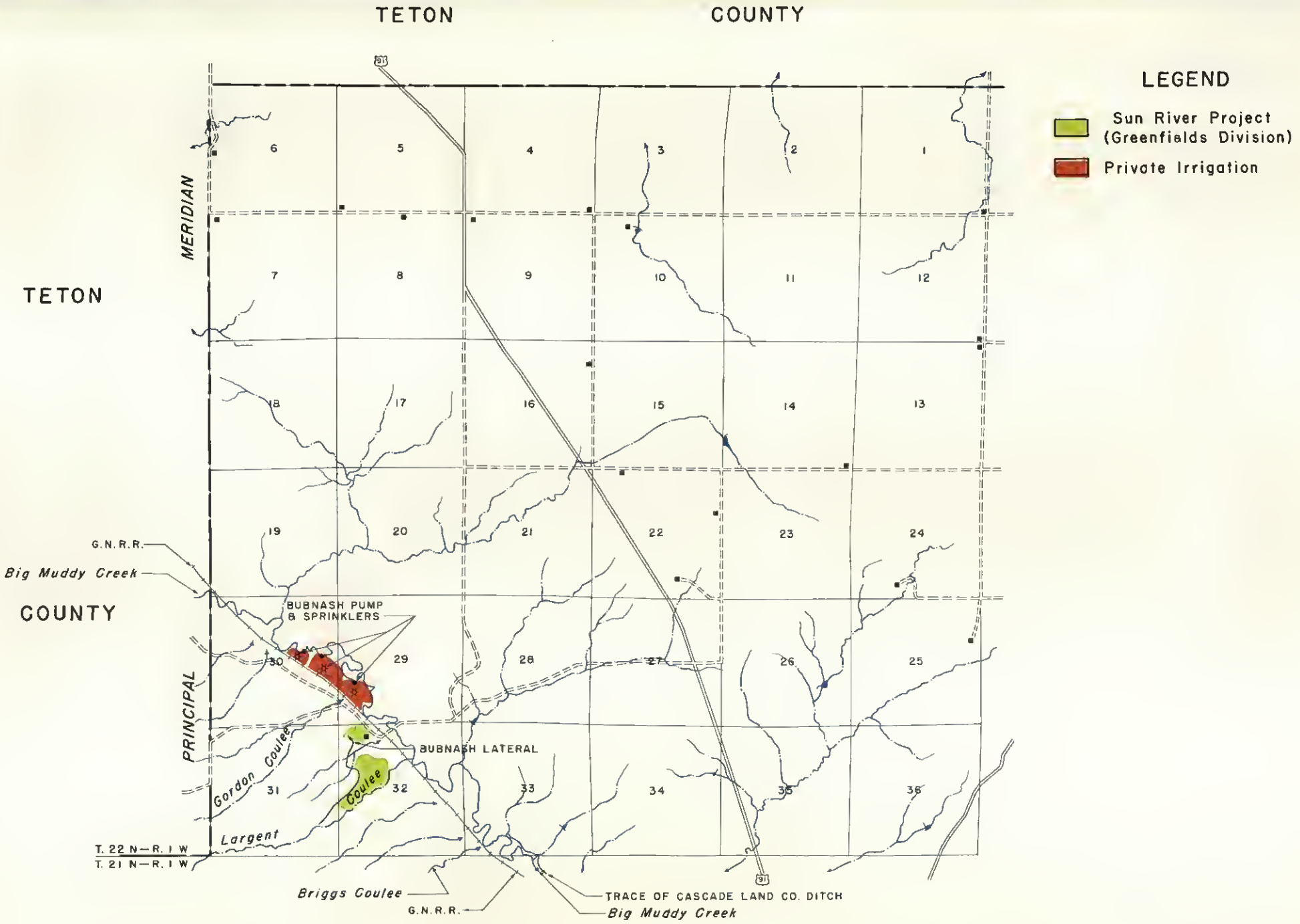
T. 21 N.—R. 2 E


TETON COUNTY
GREENFIELDS SOUTH LATERAL
GREEHFIELD SOUTH LATERAL
MILL COULEE LATERAL
CROWE SCHOOL
Largent Coulee
MERIDIAN
PRINCIPAL
Hubert
HAMANN DITCHES
DAVIES DITCHES
C.M. ST. P. & P. R.R.
Mill Coulee Creek
SUN RIVER VALLEY DITCH
DRACUTT JUNCTION
G.N.R.R.
KUNZ DITCH
HITCHCOCK PUMP & DITCH
PARKER PUMP & SPRINKLER
HITCHCOCK PUMP (NOT IN USE)
SUN RIVER
Sun River
PARKER PUMP & DITCHES
LEACH PUMP & DITCH
T. 21 N.—R. 2 W
T. 20 N.—R. 2 W
FIFTH STANDARD PARALLEL NORTH
Sun River
FORT SHAW LATERALS
G.N.R.R.
FORT SHAW LATERALS
LEGEND
Sun River Project (Fort Show Division)
Sun River Project (Greenfields Division)
Sun River Volley Ditch Co.
Privote Irrigotion
GREENFIELDS SOUTH LATERAL

T. 21 N.—R. 1 W


TETON COUNTY
GREENFIELD SOUTH CANAL
LEGEND
Sun River Project (Greenfields Division)
Rocky Reef Ditch Company
Private Irrigation
GREENFIELD SOUTH CANAL
C.M. ST. P. & P. R. R.
TETON
COUNTY
BIG DITCH FLOWEREE RANCH
MILL
COULEE
LATERAL
ASHEULOT
C.M. ST. P. & P. R. R.
MILL COULEE LATERAL
NORRIS DITCH
Coulee
Blackfoot
Big Coulee
T. 21 N — R. 3 W
T. 20 N — R. 3 W
FIFTH STANDARD PARALLEL NORTH
BIRCHMEADE DITCH
ROCKY REEF DITCH
BIRCH DAMS & DITCHES

T. 21 N.—R. 2 W


TETON COUNTY
LEGEND
Sun River Project (Greenfields Division)
Private Irrigation
TETON COUNTY
MERIDIAN
PRINCIPAL
G.N.R.R.
Big Muddy Creek
BUBNASH PUMP & SPRINKLERS
BUBNASH LATERAL
Gordon Coulee
Coulee
Largent
Briggs Coulee
G.N.R.R.
TRACE OF CASCADE LAND CO. DITCH
Big Muddy Creek
T. 22 N—R. 1 W
T. 21 N—R. 1 W
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

T. 22 N.—R. 1 E